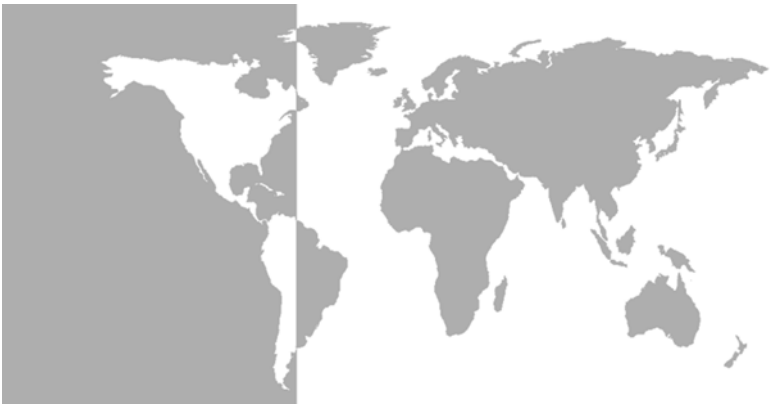
GE
Sensing & Inspection Technologies



Moisture Monitor Series 35 IS

Single-Channel Hygrometer

User's Manual

GE
Sensing & Inspection Technologies

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Single-Channel Hygrometer

User's Manual
910-182D
March 2008

Warranty

Each instrument manufactured by GE Sensing, Inc. is warranted to be free from defects in material and workmanship. Liability under this warranty is limited to restoring the instrument to normal operation or replacing the instrument, at the sole discretion of GE. Fuses and batteries are specifically excluded from any liability. This warranty is effective from the date of delivery to the original purchaser. If GE determines that the equipment was defective, the warranty period is:

- one year from delivery for electronic or mechanical failures
- one year from delivery for sensor shelf life

If GE determines that the equipment was damaged by misuse, improper installation, the use of unauthorized replacement parts, or operating conditions outside the guidelines specified by GE, the repairs are not covered under this warranty.

The warranties set forth herein are exclusive and are in lieu of all other warranties whether statutory, express or implied (including warranties or merchantability and fitness for a particular purpose, and warranties arising from course of dealing or usage or trade).

Return Policy

If a GE Sensing, Inc. instrument malfunctions within the warranty period, the following procedure must be completed:

1. Notify GE, giving full details of the problem, and provide the model number and serial number of the instrument. If the nature of the problem indicates the need for factory service, GE will issue a RETURN AUTHORIZATION NUMBER (RAN), and shipping instructions for the return of the instrument to a service center will be provided.
2. If GE instructs you to send your instrument to a service center, it must be shipped prepaid to the authorized repair station indicated in the shipping instructions.
3. Upon receipt, GE will evaluate the instrument to determine the cause of the malfunction.

Then, one of the following courses of action will then be taken:

- If the damage is covered under the terms of the warranty, the instrument will be repaired at no cost to the owner and returned.
- If GE determines that the damage is not covered under the terms of the warranty, or if the warranty has expired, an estimate for the cost of the repairs at standard rates will be provided. Upon receipt of the owner's approval to proceed, the instrument will be repaired and returned.

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Chapter 1

Features & Capabilities

The Series 35 IS, a microprocessor-based, single-channel hygrometer, measures moisture content in gases. The Series 35 IS is suitable for use in a wide range of process conditions requiring real-time moisture measurement. It measures dew/frost points over a temperature range of –110 to +60°C (–166 to +140°F).

The following topics are discussed in this chapter:

- The Electronics Unit [page 1-2]
- Moisture Probes [page 1-3]
- The Sample System [page 1-3]
- The User Program [page 1-4]

The Electronics Unit

The Series 35 IS portable moisture monitor is available in two configurations:

- with a self-contained sample system
- without a self-contained sample system.

Both Series 35 IS configurations display measurement data on a one-line, 16-character alpha-numeric LCD display screen. All probe information is entered into the unit using the programming keys on the front panel keypad (see Figure 1-1 below). The Series 35 IS operates on an internal 6 VDC battery, and the unit can operate while being charged with a 12 VDC charger.

Caution!
Do not use AC power in hazardous areas. Charge the battery only in a non-hazardous area.

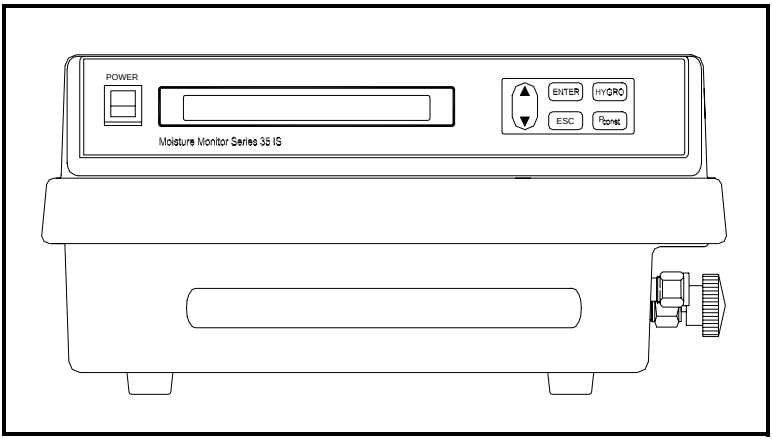


Figure 1-1: Series 35 IS Front Panel

Moisture Probes

The moisture probe is the part of the system that comes in contact with the process, and is usually installed in a sample system. The Series 35 IS uses any M Series probe to measure dew point temperature in °C or °F. A sensor assembly is secured to the probe mount and protected with a sintered stainless steel shield (see Figure 1-2 below). Other types of shields are available.

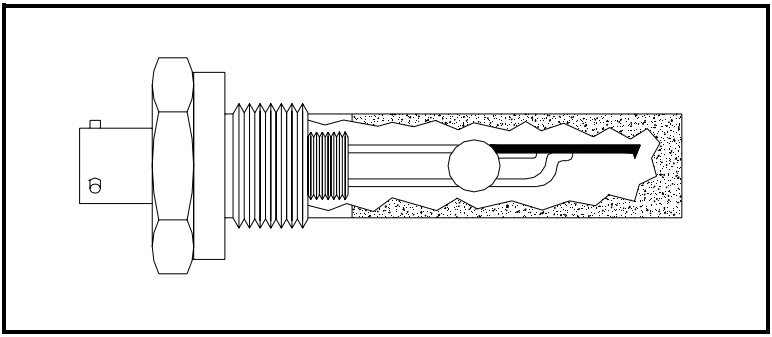


Figure 1-2: The M Series Probe

The Sample System

The sample system conditions or controls a sample stream to the specifications of the measurement probe. Typically, the sample system is kept very simple, with as few components as possible located upstream of the measurement probe. The sample system may include a filter to remove particulates from the sample stream and/or a pressure regulator to reduce or control the pressure of the sample stream. In general, stainless steel is the preferred material for all the sample system's wetted parts.

If it was specified at the time of purchase, your Series 35 IS will include a self-contained sample system.

The User Program

The Series 35 IS contains a user program that enables you to change moisture calibration data and select a number of user-defined program functions.

All functions and features of the Series 35 IS user program are discussed in Chapter 3, *Operating the Series 35 IS*.

Chapter 2

Installing the Series 35 IS

This chapter discusses installing the Series 35 IS in all its configurations. Use the following list of procedures to help you install your unit.

Depending on the type of unit you have, refer to the appropriate section(s) that follow to install your Series 35 IS correctly.

Installing your Series 35 IS consists of the following procedures:

- Choosing a Measurement Site [page 2-2]
- Moisture Probe Considerations [page 2-3]
- Sample System Guidelines [page 2-5]
- Mounting an External Sample System [page 2-6]
- The Self-Contained Sample System [page 2-7]
- Installing a Probe into a Sample System [page 2-8]
- Making External Probe Connections [page 2-11]

Proceed to the appropriate section to install your Series 35 IS.

Choosing a Measurement Site

You should have discussed environmental factors with a GE Sensing applications engineer or field sales person before you receive your Series 35 IS. The equipment should be suited to both the application and the measurement site.

Read the following guidelines to verify that you have selected the best measurement site.

- Choose a measurement site for the probe and sample system as close to the process line as possible. Avoid long lengths of connecting tubing. If long distances are unavoidable, a fast-sampling bypass loop is recommended.
- Do not install any other components, such as filters, upstream of the probe or sample system unless instructed to do so by GE Sensing. Many common components, such as filters and pressure regulators, are not suitable for sample systems. These components contain wetted parts that may absorb or release materials (e.g., moisture) into the sample stream or allow ambient contamination to enter the sample stream. In general, use stainless-steel for all parts in contact with the sample.
- Observe all normal safety precautions. Use the probes within their maximum pressure and temperature ratings.
- Do not expose the electronics unit to high temperatures, strong electrical transients, mechanical vibrations, corrosive atmospheres, or any other conditions that could damage or interfere with the Series 35 IS operation. See Chapter 5, *Specifications,* for limits.
- If you are using an external sample system, you should observe the proper cable restrictions for the probes. The M Series probes require specially shielded cable. For units with separate sample systems, you can locate the M Series probes up to 100 meters (330 feet) from the Series 35 IS.
- Protect the probe cables from excessive strain (bending, pulling, twisting, etc.). In addition, do not subject the cables to temperatures above 65°C (149°F) or below –50°C (–58°F).

Moisture Probe Considerations

The M Series probes consist of an aluminum oxide sensor located on a connector and covered by a protective stainless-steel shield.

The probe sensor materials and housing maximize durability and minimize water absorbing surfaces in the vicinity of the aluminum oxide surface. A sintered stainless-steel shield protects the sensor from high flow rates and particulate matter (other shields are available). Do not remove the shield except upon advice from GE Sensing.

The sensor design permits the device to withstand normal shock and vibration. Be sure to avoid touching the active sensor surface or allowing it to come into direct contact with foreign objects. Such contact may adversely affect performance.

Observing these precautions should ensure a long and useful probe life. GE Sensing recommends that you check probe calibration routinely, at one-year intervals, or as recommended by the applications engineers for your particular application.

Because the probe measures water vapor pressure in its immediate vicinity, proximity to the system walls, materials of construction, and other environmental factors can influence readings. You can operate the sensor under vacuum or pressure and under dynamic or static conditions. Observe the following environmental precautions.

1. **Temperature Range:** the standard probe is operable from –110°C to +70°C (–166°F to +158°F).
2. **Moisture Condensation:** be sure the temperature is at least 10°C higher than the dew/frost point temperature. If this condition is not maintained, moisture condensation could occur on the sensor or in the sample system and cause reading errors. If reading errors occur, refer to “Aluminum Oxide Probe Maintenance” in Appendix A.

Moisture Probe Considerations (cont.)

3. **Static or Dynamic Use**: the sensor performs equally well in still air or where considerable flow occurs. Its small size makes it ideal for measuring moisture conditions within completely sealed containers or dry boxes. It also performs well under gas flow linear velocities as high as 10,000 cm/sec, and liquid flow linear velocities to 10 cm/sec. Refer to Tables A-2 and A-3 in Appendix A for maximum gas and liquid flow rates.
4. **Pressure**: the moisture probe always senses the existing water vapor pressure regardless of the total ambient pressure. The moisture sensor measures water vapor under vacuum or high pressure conditions from as little as a few microns Hg to as high as 5000 psi total pressure.
5. **Long-Term Storage & Operational Stability**: continuous abrupt humidity changes do not affect the sensor, and exposure to saturation conditions does not damage the sensor, even when stored.
6. **Freedom from Interference**: the presence of a wide variety of gases or organic liquids does not affect the sensor. Also, large concentrations of hydrocarbon gases, Freon®, carbon dioxide, carbon monoxide, and hydrogen do not affect sensor water vapor indications. The sensor functions properly in a multitude of gaseous or non-conductive liquid environments.
7. **Corrosive Materials**: avoid all materials that are corrosive or otherwise damaging to aluminum or aluminum oxide. These include strongly acidic or basic materials and primary amines.

Freon is a registered trademark of E.I. du Pont de Nemours and Company.

Sample System Guidelines

A sample system, although not mandatory, is highly recommended for moisture measurement. The purpose of a sample system is to condition or control a sample stream to within the specifications of the probe. The application requirements determine the design of the sample system. GE Sensing applications engineers can make recommendations based on the following general guidelines:

- Typically, keep the sample system simple. Include as few components as possible and locate all or most of the components downstream of the measurement probe. A simple sample system consists of an explosion-proof housing with a sample cell, a filter, and inlet and outlet needle valves.
- Do not use any material for sample system components that can affect measurements. A sample system may include a filter to remove particulates from the sample stream and/or a pressure regulator to reduce or control the pressure of the stream. However, most common filters and pressure regulators are not suitable for sample systems because their wetted parts may absorb or release components (such as moisture) into the sample stream. They may also allow ambient contamination to enter the sample stream. In general, use stainless-steel for all wetted parts.

Note: *The actual sample system design depends on the application requirements.*

Mounting an External Sample System

Note: *If you have a Series 35 IS with a self-contained sample system, disregard this section and proceed to* The Self-Contained Sample System *on page 2-7.*

The sample system is usually fastened to a metal plate that has four mounting holes. GE Sensing can provide the sample system in an enclosure, if requested. Sample system outline and dimension drawings are included in your shipment, if you ordered them.

Use the following steps to mount the external sample system and connect it to the process:

1. Fasten the sample system plate or enclosure to a solid stable surface with bolts and washers in each of its four corners.
2. Connect the process supply and return lines to the sample system inlet and outlet using the required stainless-steel fittings and tubing.

Caution!
Do not start a flow through the system until the probe has been properly installed.

Note: *For common applications, GE Sensing can provide a standard sample system. If applicable, additional instructions on how to start up and shut down the sample system may be included.*

The Self-Contained Sample System

The Portable Series 35 IS can include a self-contained sample system as shown in Appendix B. This sample system is constructed with 1/4" Swagelok® inlet and outlet compression fittings and 1/4" stainless-steel tubing.

The sample system also includes inlet and outlet needle valves and a 7-micron sintered stainless-steel filter with a replaceable element. All wetted parts are Series 300 stainless steel, Viton®, or Teflon®. The maximum allowable pressure for the sample system is 4500 psig. See Figure 2-1 below.

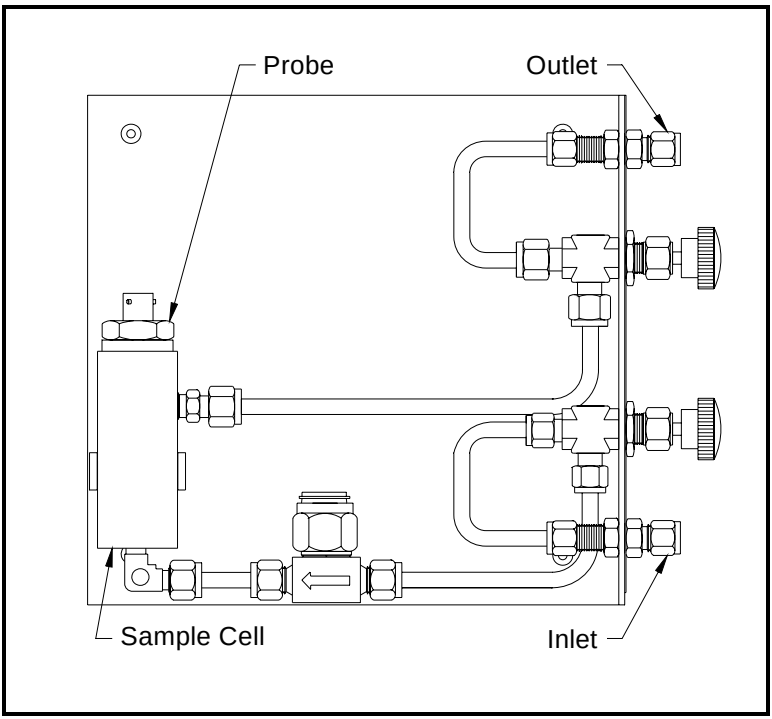


Figure 2-1: Self-Contained Sample System with Probe

Swagelok is a registered trademark of Crawford Fitting Company.
Teflon is a registered trademark of E.I. du Pont de Nemours and Company, Inc.
Viton is a registered trademark of DuPont Dow Elastomers, L.L.C.

Installing a Probe into a Sample System

The sample system design protects the aluminum oxide moisture probe from particulates and is recommended for process gases such as dry instrument/plant air or other similar process gas. Other sample handling equipment (pressure regulators, cooling coils, additional filters, pressure gauges, rota-meters, etc.) may be required for some applications. Contact GE Sensing or see Appendix A for general information about using the GE Sensing Aluminum Oxide Moisture Probe. Proceed to the appropriate probe installation section for your system.

Caution!

If you mount the probe directly into the process line, consult GE Sensing for proper installation instructions and precautions.

External Sample System

Use the following steps to install the probe into the external sample cell. Refer to Figure 2-2 below.

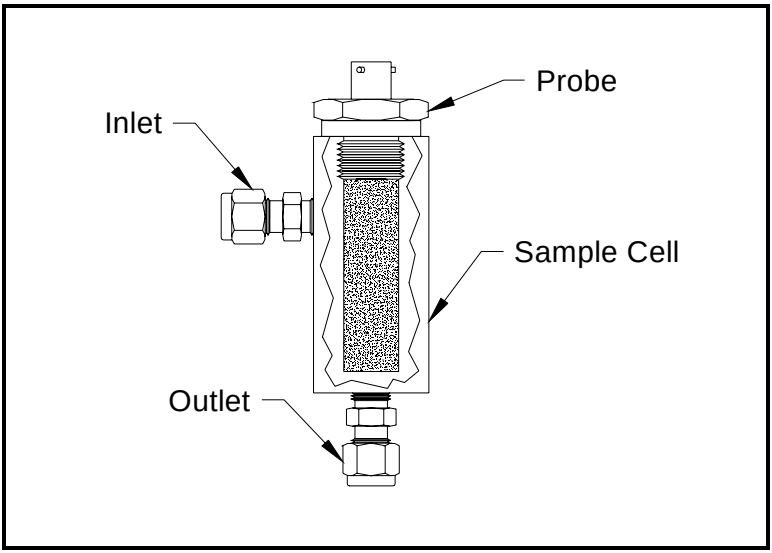


Figure 2-2: A Typical Probe Installation

External Sample System (cont.)

1. Insert the probe into the sample cell so that it is perpendicular to the sample inlet.

IMPORTANT: *For maximum protection of the aluminum oxide sensor, always leave the shield in place.*

2. Screw the probe into the receptacle fitting, making sure not to cross the threads.

Note: *M2 probes have 3/4-16 straight threads with an o-ring seal for installation either into the sample system or directly into the process line. Other mounts are available for special applications.*

3. Hand-tighten the probe in a clockwise direction, then tighten it an additional 1/8 turn with a wrench.

Figure 2-2 on page 2-8 shows a typical probe installation with the probe mounted into a sample cell.

Self-Contained Sample System

Use the following steps to install the probe into the sample cell of a self-contained sample system:

1. Loosen the two quarter-turn screws on the back of the Series 35 IS cover.
2. Remove the cover by gently lifting it off the unit from back to front. Be careful not to pull on the cables that connect to the cover.
3. Insert the probe into the sample cell.
4. Screw the probe into the receptacle fitting, making sure not to cross the threads.

Note: *Insert the probe into the cylindrical shaped container called the* sample cell, *which is included as part of your sample system. M2 probes have 3/4-16 straight threads and an o-ring seal for installation of the probe into the standard sample cell (see Figure 2-1 on page 2-7).*

5. Hand-tighten the probe in a clockwise direction, then tighten it an additional 1/8 turn with a wrench.
6. Connect the blue probe cable to the probe by inserting the bayonet-type connector onto the probe and twisting the shell clockwise until it snaps into a locked position.

Note: *The connector on the probe cable must be rotated until it aligns with the pins in the probe connector, before the cable may be properly inserted into the probe and secured.*

7. Close the Series 35 IS cover and tighten the two quarter-turn screws on the back of the cover.

Making External Probe Connections

Probe connections may differ, depending on the type of sample system you are using. Connect the moisture probe using a continuous run of GE Sensing two-wire shielded cable (see Figure 2-3 below).

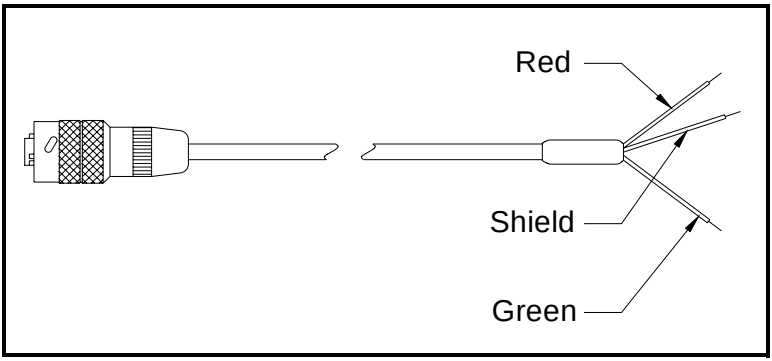


Figure 2-3: Two-Wire Shielded Cable

Protect all cables from excessive strain (bending, pulling, etc.). Do not subject cables to temperatures above +65°C (149°F) or below –50°C (–58°F). You can order standard cable assemblies (including connectors) from GE Sensing in any length up to 100 meters (330 feet).

Use the following steps to make probe connections:

Note: *Probe connections for an internal sample system have been described in the previous section. The following instructions are for an external sample system only.*

1. Turn off the Series 35 IS.
2. Connect the cable to the probe by inserting the bayonet-type connector onto the probe and twisting the shell clockwise until it snaps into a locked position.

Making External Probe Connections (cont.)

Note: *The connector on the probe cable must be rotated until it aligns with the pins in the probe connector, before the cable may be properly inserted into the probe and secured.*

3. Connect the other end of the probe cable to the terminal block on the Series 35 IS side panel (see Table 2-1 below and Figure 2-4 on page 2-13).

IMPORTANT: *To maintain good contact at each terminal block and to avoid damaging the pins on the connector, pull the connector straight off (not at an angle), make cable connections while the connector is away from the unit, and push the connector straight on (not at an angle) when the wiring is complete.*

Caution!

The M Series probe may not be capable of withstanding the 500 V insulation test required by clause 5.7 of EN50 020 when installed in the process media. This must be taken into account in any installation in which it is used.
(See Cert. #Ex95C2002X in its entirety.)

Table 2-1: Probe Connections

Connect:	To PROBE Terminal Block
Red (H2) wire	pin 1
Shield	pin 2
Green (H1) wire	pin 3

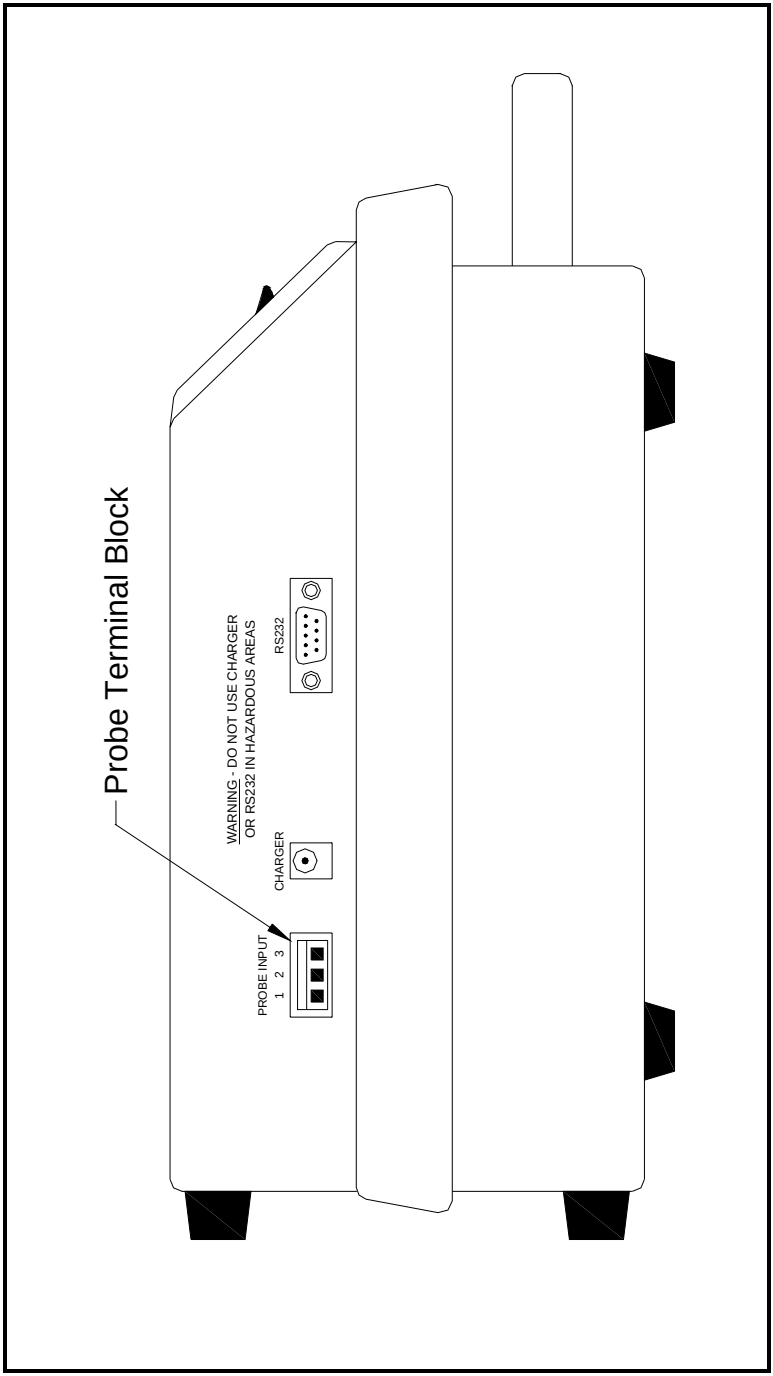


Figure 2-4: Probe Terminal Block Location

Using Modified or Non-GE Sensing Cables

In some installations, it may be desirable to use a pre-existing moisture cable or to modify the standard GE Sensing moisture cable. If this approach is taken, it is essential that the following precautions be observed. Furthermore, after connecting the moisture probe, a calibration adjustment must be performed to compensate for any electrical offsets introduced by the non-standard cable.

Caution!

GE Sensing cannot guarantee operation of the Series 35 IS to the specified accuracy unless a standard GE Sensing hygrometer cable is used.

1. Use cable that matches the electrical characteristics of GE Sensing cable (contact the factory for specific information on cable characteristics).
2. If possible, avoid all splices. Splices will impair the performance of the instrument. When possible, instead of splicing, coil the excess cable.
3. If you must splice cables, be sure the splice introduces minimum resistive leakage or capacitive coupling between conductors.
4. Carry the shield through any splice. A common mistake is to not connect the shields over the splice. If you are modifying a GE Sensing cable, the shield will not be accessible without cutting back the cable insulation. Also, do not ground the shield at both ends. The shield should be grounded only at the hygrometer end, as described in Table 2-1 on page 2-12.

Performing a Calibration Adjustment

After completing the installation of a modified or non-standard moisture cable, it is necessary to perform a calibration adjustment on the Series 35 IS. This procedure will adjust the electronics to compensate for any error or offset introduced by splices or long cable lengths. It is also recommended that a calibration be performed after the installation of a new GE Sensing cable, to verify the accuracy of the unit.

Use the following steps to perform a calibration adjustment:

1. Power up the Series 35 IS.
2. To check the new cable, set up the screen to display “MH”. See Chapter 3, *Operating the Series 35 IS*, for instructions on how to navigate through the user program.
3. Note the high, low and zero reference values that are recorded on the sticker located on the inside of the Series 35 IS chassis.
4. Disconnect the cable from the probe only (leave the cable connected to the Series 35 IS), and verify that the displayed MH value equals the zero reference value within ±0.0003 MH. If this reading is within specifications, no further testing is necessary.
5. If the zero reference value reading above was out of range, the low reference value must be adjusted. For readings more than 0.0003 below the previously recorded zero reference value, add the difference to the low reference value. For readings more than 0.0003 above the previously recorded zero reference value, subtract the difference from the low reference value. Record the final corrected low reference value.
6. Reprogram the Series 35 Is with the new, corrected low reference value. See *Entering High and Low Reference Values* in Chapter 3.
7. Make sure the cable is still disconnected from the probe but is connected to the Series 35 IS.

Performing a Calibration Adjustment (cont.)

8. Recheck the zero reference reading and verify that it is now within ±0.0003 MH of the previously recorded value.

9. Fill out a new reference sticker with the final low reference value and/or record the information on the *Data Information Sheet* in Appendix D. Make sure the following information is included:

- HIGH REF = Original Value
- LOW REF = New Corrected Value
- ZERO REF = Original Recorded Value

10. Reconnect the cable to the probe.

Note: *If the cable is changed in any way, repeat the above procedure for maximum accuracy of the unit.*

The Series 35 IS is now ready for operation. Proceed to Chapter 3, *Operating the Series 35 IS*.

Chapter 3

Operating the Series 35 IS

Your factory-programmed Series 35 IS can begin taking measurements as soon as you turn the power on. The user program enables you to enter and change setup information.

Note: *The Series 35 IS suspends taking measurements when you enter the user program listed below. Refer to the menu map in Appendix C to navigate the user program.*

This section explains the following procedures:

- Getting Started [page 3-2]
- Using the Keypad to Enter and Change Data [page 3-5]
- Verifying and Changing Factory Setup Data [page 3-9]
- Changing the Measurement Display [page 3-14]
- Entering an Offset Value for Dew/Frost Point [page 3-15]
- Entering a Constant Pressure Value [page 3-16]
- Entering a PPMv Constant Multiplier [page 3-18]
- Entering an Interval for Automatic Calibration [page 3-19]
- Viewing the Battery Status [page 3-21]
- Entering a Backlight-On Time Interval [page 3-22]
- Setting Up Computer-Enhanced Response [page 3-23]
- Setting Up Range Error Processing [page 3-25]
- Selecting AC Line Frequency (60/50 Hz) [page 3-26]
- Adjusting the Contrast [page 3-27]
- Setting the Clock Values [page 3-28]
- Setting Up the Data Logger [page 3-30]

Getting Started

Your unit is completely set up at the factory. To begin taking measurements, you only need to apply power to the unit and start up the sample system. Complete the instructions in the following sections to get your unit up and running:

- Starting Up and Shutting Down the Sample System
- Powering up the Series 35 IS

Starting Up and Shutting Down the Sample System

If your Series 35 IS has a self-contained sample system, use this section to properly *start up* the sample system before you begin taking measurements, and to *shut down* the sample system when you have finished taking measurements.

Note: *If you are using an external sample system, refer to the separate manual supplied with your order.*

Starting Up the Sample System

In order to operate the self-contained sample system correctly, first determine if you need to make measurements at atmospheric pressure or at process pressure. After determining the pressure, use the appropriate section that follows to start up and shut down the sample system.

Note: *The maximum allowable pressure for the self-contained sample system for the Series 35 IS is 4500 psig.*

At *Atmospheric Pressure*:

1. Begin with the Series 35 IS inlet and outlet valves in the closed position, then open the outlet valve completely.
2. Open the inlet valve slightly to allow only a small amount of flow from the process.

At *Process Pressure*:

1. Begin with the Series 35 IS inlet and outlet valves in the closed position, then slowly open the inlet valve fully.
2. Open the outlet valve slightly to allow only a small amount of flow.

Shutting Down the Sample System

At *Atmospheric or Process* Pressure:

1. Close the inlet valve completely.
2. Wait for the flow from the outlet valve to stop.
3. Close the outlet valve to keep the probe sensor from being affected by ambient moisture.

Powering Up the Series 35 IS

To turn on the Series 35 IS, press the POWER switch (located on the left side of the front panel) to the ON position. (If the battery is depleted, see Chapter 4, *Troubleshooting,* to recharge the battery.)

The Series 35 IS displays “Loading. . . .”, followed by a series of additional screens. This indicates that the system is loading calibration and reference data. After this data is loaded, the Series 35 IS automatically calibrates (Autocal) the moisture circuitry, and then begins taking measurements.

Using the Keypad to Enter and Change Data

The Series 35 IS user program enables you to change factory set-up data and user-defined program functions.

Use the appropriate sections that follow to learn how to:

- Use the programming keys
- Enter and exit the user program
- Move through the user program
- Enter numeric data

How to Use the Programming Keys

The membrane keypad to the right of the display window on the front panel of the Series 35 IS contains six (6) keys:

- **ENTER** - Use this key to: enter a menu option; switch from viewing to editing data; move to the next digit position during numeric entry; confirm an entry.
- **ESC** - Use this key to: cancel an entry; move back up one level in the menu sequence.
- Δ - This key scrolls upward through the menu options and increases the value during numeric entry.
- ∇ - This key scrolls downward through the menu options and decreases the value during numeric entry.
- **HYGRO** - Press this key in measurement mode to display the dew/frost point temperature in the selected units.
- **P_{const}** - Press this key in measurement mode to display the pressure in the selected units.

How to Enter and Exit the User Program

To enter programming mode, perform the following sequence within five (5) seconds, or the Series 35 IS will time out and return to measurement mode.

P: +0.00 Kcmg	While in measurement mode, press the [ESC] key.
ESC	Within 5 seconds of the appearance of this display, press the [ENTER] key followed by the [ESC] key.
PROGRAM MENU	This will display for 1 second.
DP RANGE	You are now in the user program menu.

From the main menu, use the arrow keys to scroll through the options to your selection. Use the [ENTER] key to confirm your selection or the [ESC] key to cancel your selection.

To exit the user program, press the [ESC] key until RUN ? displays, then press the [ENTER] key to return to displaying measurements.

DP RANGE	Press the [ESC] key.
RUN?	Press the [ENTER] key.
Exiting.....	This will display for 1 second.
P: +0.00 Kcmg	You have now returned to measurement mode.

How to Move Through the User Program

Use the arrow keys to scroll through the following menu options. Refer to the Menu Map (Figure C-1) in Appendix C as a guide, while moving through the user program.

Note: *While in the programming mode, the Series 35 IS suspends taking measurements.*

- **DP RANGE** - Use to enter high and low dew points for the calibration curve. This input determines the number of points in the Moisture Probe Calibration Data entry, and shows the maximum/minimum dew point values in degrees celsius (°C), as shown on the Moisture Probe Calibration Data Sheet.
- **MH CURVE** - Use to enter a value for each point in the calibration curve. This Moisture Probe Calibration Data Entry accepts only MH values. The dew point automatically increases at 10°C intervals.
- **SERIAL #** - Input the moisture probe serial number.
- **HYGRO REFERENCE** - Use to enter high and low reference values for moisture measurement.
- **USER** - Use to set up user-defined program functions, such as offset value, constant pressure, PPMv multiplier, Autocal interval, battery, backlight interval, computer enhanced response (optional), range error handling, selecting 60/50 Hz, contrast, and clock.
- **FACTORY SETUP** - Used for GE Sensing field service and factory use only. A passcode is required to access this function.
- **LOGGER** - This optional section lets you program the unit to log data at pre-selected time intervals and access the logged data for viewing or for sending to a dump terminal. It includes log interval, log setup, log display, and log dump settings.

How to Enter Numeric Data

To enter numbers one digit at a time, use the arrow keys to scroll to the desired number, then press the [ENTER] key to move to the next digit position. Repeat this procedure until all numbers have been entered.

Note: *In the programming mode, pressing an arrow key lets you enter the edit mode. Pressing* [ESC] *terminates the edit mode without changing any data. In edit mode, check all characters before pressing the* [ENTER] *key and moving to the next digit position.*

Verifying and Changing Factory Setup Data

Use this section to confirm, or make any necessary changes to, the factory setup data. The setup data includes information regarding the moisture probe as listed below:

- Dew point range
- Calibration data
- Probe serial number
- High and low reference values

Note: *Remember to record all setup data in Appendix D, Data Information Sheet, in the back of this manual.*

The factory enters all the necessary data into your Series 35 IS. Therefore, you should not need to re-enter this data unless you

- Purchase a new probe
- Recalibrate an existing probe
- Have reason to believe the data is corrupted.

Use the appropriate sections that follow to verify and/or change the setup data.

Entering the Dew Point Range

Use the DP RANGE to enter high and low dew point values. The Series 35 IS uses this range to determine the number of points in the calibration curve.

Note: *Enter the user program as described on page 3-6.*

DP RANGE	Use the arrow keys to scroll to DP RANGE and press the [ENTER] key.
Hi DP	Scroll to this screen with the arrow keys and press the [ENTER] key.
Hi DP +20°C	Use the arrow keys to scroll to the desired dew point value, then press the [ENTER] key.

Note: *The high and low dew points are listed on the Moisture Probe Calibration Data Sheet located in the probe box. The default values are: Low = -110°C, High = +20°C.*

Hi DP	Press the down arrow key.
Low DP	Press the [ENTER] key.
Low DP -110°C	Use the arrow keys to scroll to the desired value. Then, press the [ENTER] key.
Low DP	Press [ESC] to return to the main menu, and proceed to the next section.

IMPORTANT: If you change the dew point settings, you must change the calibration curve also.

Entering Calibration Data

After entering the high and low dew point values, use the MH CURVE option to enter calibration data for the moisture probe in accordance with the following procedure.

Note: *Remember to record all set-up data in Appendix D,* Data Information Sheet*, in the back of this manual.*

Moisture probe calibration data is taken at fixed dew point values in 10°C intervals. After the high and low dew point values have been entered, the appropriate number of data points for the moisture probe is automatically determined. Starting with the minimum dew point value, the MH values must be entered in 10°C increments until the maximum dew point is reached.

Note: *Changing the dew point setting affects the MH curve.*

MH CURVE

Use the arrow keys to scroll to MH CURVE and press the [ENTER] key.

-110°C	MH 0.1890

Press the arrow keys to scroll through the MH values. Press [ENTER] then the arrow keys to edit a value. (ED displays in edit mode and MH displays in view mode.) Using the arrow keys and the [ENTER] key, edit the value one digit at a time, and then press [ENTER].

Note: *To abort the editing function at any time without changing the value, press the* [ESC] *key.*

Repeat the above procedure for each point in the MH Curve. Then, press [ESC] until you return to main menu and proceed to the next section.

Entering the Probe Serial Number

The probe serial number is listed on the Calibration Data Sheet and is inscribed on the hex nut of the moisture probe.

Note: *Remember to record all set up data in Appendix D,* Data Information Sheet*, in the back of this manual.*

USER	From the main menu, use the arrow keys to scroll to the USER prompt, then press the [ENTER] key to view the options.
SERIAL #	Use the arrow keys to scroll to SERIAL # and press the [ENTER] key.
xxxxxx S/N	The unit displays the current serial number.
123456 S/N	To edit the serial number, press an arrow key and a blinking cursor appears at the left-most digit. Use the arrow keys to scroll to the desired value and press [ENTER] to move the cursor to the next digit. Repeat until you have entered all six serial number digits. Press the [ENTER] key to confirm the change or the [ESC] key to cancel the change.
SERIAL #	Press the [ESC] key to return to the main menu.

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Entering High and Low Reference Values

The Series 35 IS requires high and low reference values for its moisture measurement circuitry. These factory calibration values, specific to each unit, are listed on a label inside the unit.

IMPORTANT: Do not change the high and/or low reference values unless instructed to do so by GE Sensing.

Note: *Remember to record all setup data in Appendix D,* Data Information Sheet*, in the back of this manual.*

HYGRO REFERENCE	Use the arrow keys to scroll to HYGRO REFERENCE and press the [ENTER] key.
High REF	Press either arrow key to scroll to the High REF option, then press the [ENTER] key.
HX.XXXX	Use the arrow and [ENTER] keys to change the value one digit at a time, then press [ENTER].

Note: *To abort the editing function at any time without changing the value, press the* [ESC] *key.*

Low REF	Press either arrow key to scroll to the Low REF option, then press the [ENTER] key.
LX.XXXX	Use the arrow and [ENTER] keys to change the value one digit at a time, then press [ENTER].

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Changing the Measurement Display

The front panel of the Series 35 IS contains two keys that let you quickly change the L.C.D. display mode during operation of the unit. These display keys are labeled HYGRO and P_{const}.

- **HYGRO** - Press this key to display and scroll through all the available moisture measurement units (DP/°C, DP/°F, PMv, MH).
- **P_{const}** - Press this key to display and scroll through all available constant pressure units (PSG, Bar, KPAg, Kcmg).

After you select a specific display mode, that display remains on the screen until you choose another display mode or until you enter the programming mode. Upon exiting the programming mode and returning to measurement mode, the screen automatically returns to the previously selected display mode.

Entering an Offset Value for Dew/Frost Point

Use this option to adjust the displayed dew/frost point reading. A positive number increases the reading and a negative number decreases the reading. The offset value always displays in dew/frost point degrees C.

Note: *Enter the user program as described on page 3-6.*

USER	From the main menu, use the arrow keys to scroll to the USER prompt, then press the [ENTER] key to view the options.
OFFSET	Use the arrow keys to scroll to OFFSET and press the [ENTER] key.
OFFSET +5.0 °C	The current offset value is displayed.
OFFSET +10.0 °C	Press either arrow key to delete the current value and enter the edit mode. Use the arrow and [ENTER] keys to change the value one digit at a time, then press the [ENTER] key.

Note: *To abort the editing function at any time without changing the value, press the* [ESC] *key.*

OFFSET	Press the [ESC] key to return to the main menu.

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Entering a Constant Pressure Value

This option lets you enter a fixed value for the pressure of the sample gas at the moisture probe location. The value is used to calculate the moisture content in PPM_V.

Note: *Enter the user program as described on page 3-6.*

USER

From the main menu, use the arrow keys to scroll to the USER prompt, then press the [ENTER] key to view the options.

CONSTANT PRESSUR

Use the arrow keys to scroll to CONSTANT PRESSUR and press the [ENTER] key.

KP PSIg

The current units choice is displayed. Use the arrow keys to scroll to the desired pressure units, then press the [ENTER] key. See Table 3-1 below for the available choices.

Table 3-1: Constant Pressure Units

Available Units	Description of Units
KP psig	pounds per square inch gauge
KP bar	bars absolute
KP KPag	kilopascals gauge
KP Kcmg	kilograms per square centimeter gauge

KP: +XXX.XX PSG

The current constant pressure value is displayed.

Note: *To abort the editing function at any time without changing the value, press the* [ESC] *key.*

Entering a Constant Pressure Value (cont.)

KP: +500.00 PSG	Press either arrow key to delete the current value and enter edit mode. Use the arrow and [ENTER] keys to change the value one digit at a time, then press [ENTER].
KP: +XXX.XX PSG	The new constant pressure value is displayed. Press [ESC].
KP PSIg	The current units choice is displayed. Press [ESC] to return to the options menu.
CONSTANT PRESSUR	Press the [ESC] key to return to the main menu.

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Entering a PPMv Constant Multiplier

Use this option to apply a user-defined constant multiplier to the the PPMv value.

Note: *Enter the user program as described on page 3-6.*

USER	From the main menu, use the arrow keys to scroll to the USER prompt, then press the [ENTER] key to view the options.
PPMv MULTIPLIER	Use the arrow keys to scroll to PPMv MULTIPLIER and press the [ENTER] key.
KPPMv 1.0000	The current value is displayed. Press either arrow key to delete the current value and enter the edit mode.
KPPMv X.XXXX	Use the arrow and [ENTER] keys to enter the new multiplier, one digit at a time. Then, press [ENTER] twice to return to the options menu.
PPMv MULTIPLIER	Press the [ESC] key to return to the main menu.

Note: *PPMv constant multiplier values up to 999.9999 may be entered, but the value should be set at 1.0000 unless otherwise advised by GE Sensing. Be sure to record all entered data in Appendix D,* Data Information Sheet, *in the back of this manual.*

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Entering an Interval for Automatic Calibration

The Series 35 IS automatically calibrates itself (Autocal) at user-programmable time intervals, in order to compensate for any drift in the electronics. An Autocal interval value between 0 and 1440 minutes (24 hours) may be entered. GE Sensing recommends setting the Autocal interval to eight hours (480 minutes). If the Series 35 IS is exposed to extreme temperatures or weather conditions, a shorter Autocal interval may be more appropriate.

Note: *Enter the user program as described on page 3-6.*

USER	From the main menu, use the arrow keys to scroll to the USER prompt, then press the [ENTER] key to view the options.
AUTOCAL INTERVAL	Use the arrow keys to scroll to AUTOCAL INTERVAL and press the [ENTER] key.
ACAL (Mins) 30	The current Autocal interval value is displayed.
ACAL (Mins) XX	Press either arrow key to delete the current value and enter the edit mode. Use the arrow and [ENTER] keys to change the value one digit at a time, then press [ENTER] to return to the options menu.
AUTOCAL INTERVAL	Press the [ESC] key to return to the main menu.

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Entering an Interval for Automatic Calibration (cont.)

After you confirm the Autocal interval and return to the main menu, the Series 35 IS immediately performs an Autocal. The next time Autocal occurs depends on the length of the time interval setting.

The Series 35 IS determines the times of subsequent Autocals by establishing a fixed schedule, beginning at midnight, using the specified interval. For example, if you enter a 90-minute time interval, Autocal occurs 16 times per day
(1 day = 1440 minutes ÷ 90 minutes = 16).
The following fixed schedule applies:

1. 1:30 a.m.	**9.** 1:30 p.m.
2. 3:00 a.m.	**10.** 3:00 p.m.
3. 4:30 a.m.	**11.** 4:30 p.m.
4. 6:00 a.m.	**12.** 6:00 p.m.
5. 7:30 a.m.	**13.** 7:30 p.m.
6. 9:00 a.m.	**14.** 9:00 p.m.
7. 10:30 a.m.	**15.** 10:30 p.m.
8. 12:00 p.m.(noon)	**16.** 12:00 a.m.(midnight)

If you enter a time interval not evenly divisible into 1440 minutes, the Series 35 IS rounds up to the next acceptable interval. For example, if you set the 90-minute Autocal interval at 6:10 p.m., the next Autocal occurs at 7:30 p.m. (excluding the Autocal performed when you exit the Autocal menu).

Viewing the Battery Status

Make sure that the battery charger is disconnected before viewing the battery status.

Note: *Enter the user program as described on page 3-6.*

USER	From the main menu, use the arrow keys to scroll to the USER prompt, then press the [ENTER] key to view the options.
BATTERY	Use the arrow keys to scroll to the BATTERY option and press the [ENTER] key.
DISCONNECT A.C. Press ENTER	The display alternates between the two messages shown. Press the [ENTER] key when the AC power has been disconnected.
BAT: +6.89 V BAT: 100%	The display alternates between the two messages shown. Press the [ESC] key to return to the options menu.
BATTERY	Press the [ESC] key to return to the main menu.

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Entering a Backlight-On Time Interval

Your Series 35 IS is equipped with a backlight, which can be programmed to turn off automatically after a pre-determined time. Values between 0 and 1440 minutes (24 hours) may be entered.

Note: *Enter the user program as described on page 3-6.*

USER	From the main menu, use the arrow keys to scroll to the USER prompt, then press the [ENTER] key to view the options.
BACKLIGHT	Use the arrow keys to scroll to BACKLIGHT and press the [ENTER] key.
BLITE (Mins) 30	The current backlight interval value is displayed.
BLITE (Mins) XX	Press either arrow key to delete the current value and enter the edit mode. Use the arrow and [ENTER] keys to change the value one digit at a time, then press [ENTER] to return to the options menu.
BACKLIGHT	Press the [ESC] key to return to the main menu.

Note: *Constant use of the backlight shortens the battery life. All units are shipped with a default backlight-on time interval of 5 minutes.*

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Setting Up Computer-Enhanced Response

Note: *This option may not be installed on your Series 35 IS.*

Using a dynamic moisture calibration technique, Computer-Enhanced Response extrapolates the moisture level to the end point, when making measurements in abrupt “dry down” conditions. Response time depends on the relative change in dew point. For example, the Series 35 IS can respond in three to five minutes to reflect a change from ambient moisture to trace levels.

The accuracy of Computer-Enhanced Response equals ±2°C of the sensor reading, assuming an equilibrium with the gas. To ensure accuracy, your application should:

- Have a reasonably constant flow rate and final dew point.
- Maintain a minimum flow rate of one standard cubic foot per hour (SCFH).
- Operate at atmospheric pressure (0 psig)
- The actual moisture content must be above –85°C frost point and must be stable.

You can enable or disable the Computer-Enhanced Response feature. If the feature is not available, the display reads Option Not Avail. Otherwise, the Enhance Response display appears.

Note: *Enter the user program as described on page 3-6.*

USER	From the main menu, use the arrow keys to scroll to the USER prompt, then press the [ENTER] key to view the options.
ENHANCE RESPONSE	Use the arrow keys to scroll to the ENHANCE RESPONSE option and press the [ENTER] key.

Setting Up Computer-Enhanced Response (cont.)

ENHANCE OFF ENHANCE ON	Use the arrow keys to scroll to one of the option screens shown and press the [ENTER] key.
ENHANCE RESPONSE	Press the [ESC] key to return to the main menu.

Note: *An activated Computer Enhanced Response displays a reverse video "E" on the left side of the display. After determining the final value, the reverse video "E" changes to a regular "E".*

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Setting Up Range Error Processing

Range errors occur when an input signal within the capacity of the analyzer is outside the range of the probe calibration data. The Series 35 IS displays Range Errors with an OVER RANGE or UNDER RANGE message. The error condition extends to all displayed measurements of that mode. For example, if dew point displays OVER RANGE, then moisture in PPMv also displays OVER RANGE.

There are two available Range Error processing options:

- No Action - the range error is not displayed.
- Display - the range error is displayed.

Note: *Enter the user program as described on page 3-6.*

USER	From the main menu, use the arrow keys to scroll to the USER prompt, then press the [ENTER] key to view the options.
RANGE ERROR	Use the arrow keys to scroll to the RANGE ERROR option and press the [ENTER] key.
R_ERR = Display R_ERR = No Action	Use the arrow keys to scroll to one of the options shown and press the [ENTER] key.
RANGE ERROR	Press the [ESC] key to return to the main menu.

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Selecting AC Line Frequency (60/50 Hz)

Select this setting according to the AC line frequency in the country where the Series 35 IS is installed.

Note: *Enter the user program as described on page 3-6.*

USER	From the main menu, use the arrow keys to scroll to the USER prompt, then press the [ENTER] key to view the options.
SELECT 60/50 HZ	Use the arrow keys to scroll to the SELECT 60/50 HZ option and press the [ENTER] key.
60HZ 50HZ	Use the arrow keys to scroll to one of the options shown and press the [ENTER] key.
SELECT 60/50 HZ	Press the [ESC] key to return to the main menu.

Note: *For reference, record all entered data in Appendix D,* Data Information Sheet, *in the back of this manual.*

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Adjusting the Contrast

Use this option to adapt to the lighting conditions of the Series 35 IS installation.

Note: *Enter the user program as described on page 3-6.*

USER	From the main menu, use the arrow keys to scroll to the USER prompt, then press the [ENTER] key to view the options.
CONTRAST	Use the arrow keys to scroll to the CONTRAST option and press the [ENTER] key.
Adj. Contrast	Press the up-arrow key to increase contrast or the down-arrow key to decrease, contrast. Hold the key down for large changes or press repeatedly for small changes. Press the [ENTER] key to confirm the new setting.
CONTRAST	Press the [ESC] key to return to the main menu.

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Setting the Clock Values

The Series 35 IS has no backup power source, and the time/date must be reset whenever the battery has been totally depleted.

Note: *Enter the user program as described on page 3-6.*

USER	From the main menu, use the arrow keys to scroll to the USER prompt, then press the [ENTER] key to view the options.
CLOCK	Use the arrow keys to scroll to the CLOCK option and press the [ENTER] key.
Read Time	Use the arrow keys to scroll to READ TIME then press the [ENTER] key.
hh:mm mm/dd/yy	The current time and date are displayed for 2 seconds, before the CLOCK prompt returns.

To edit the time, use the following steps:

CLOCK	Press the [ENTER] key.
Set Time	Use the arrow keys to scroll to SET TIME. Then, press the [ENTER] key.
hh:mm	Use the arrow and [ENTER] keys to scroll to the correct hour and minutes values. Then, press the [ENTER] key.
Set Time	Press [ESC] to return to the CLOCK prompt.

Setting the Clock Values (cont.)

To edit the date, use the following steps:

CLOCK	Press the [ENTER] key.
Set Date	Use the arrow keys to scroll to SET DATE. Then, press the [ENTER] key.
MM/DD/YY	Use the arrow and [ENTER] keys to scroll to the correct month, day and year values. Then, press the [ENTER] key.

Note: *The Series 35 IS clock is year 2000 compliant.*

Set Date	Press [ESC] to return to the CLOCK prompt.
CLOCK	Press the [ESC] key to return to the main menu.

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Setting Up the Data Logger

The Series 35 IS optional data logging feature enables you to internally view and store measurement data. The main menu displays the LOGGER prompt only if this option is available on your unit.

Data is logged at user-selected time intervals and stored in the unit's FRAM. Up to three different parameters may be logged at any one time.

Note: *Because the Series 35 IS contains a fixed amount of memory, the more parameters you select and the more frequently you log data, the shorter the total available logging time.*

The Series 35 IS assigns a *record* and a *header* to all logged data. The *record* consists of logged measurement values. The *header* includes the time the log started, the constant pressure value, the log time intervals, and the selected measurement modes. By assigning each log a header, the Series 35 IS distinguishes one log from another.

The Series 35 IS can store more than one log. Each time the log setting is changed, the Series 35 IS queries if you want to overwrite or append to the existing log(s). If overwrite mode is chosen, the Series 35 IS writes over the logs currently stored in memory. If append mode is chosen, the Series 35 IS adds new log data to the end of the previously stored log data. In either case, the Series 35 IS continues logging measurement data until it runs out of memory.

Note: *Before beginning setup of the data logger, check to make sure that the clock is set to the correct time and date. See "Setting the Clock Values" on page 3-28 for the procedure to follow.*

Setting the Data Logger Time Interval

The Series 35 IS logs measurement data at a time interval that is specified by the user.

Note: *Enter the user program as described on page 3-6.*

LOGGER	From the main menu, use the arrow keys to scroll to the LOGGER prompt, then press the [ENTER] key.
LOG INTERVAL	Use the arrow keys to scroll to the LOG INTERVAL option and press the [ENTER] key.
LINTV (Mins) 15	The current log interval is displayed. Press either arrow key to delete the current value and enter the edit mode.
LINTV (Mins) XX	Use the arrow and [ENTER] keys to change the value one digit at a time, then press [ENTER] to confirm the new value.
LINTV (Mins) 30	The new log interval is displayed. Press [ENTER] to return to the options menu.
LOG INTERVAL	Press the [ESC] key to return to the main menu.

Note: *Data logging is suspended when you enter the programming mode. If you remain in the programming mode longer than the log intervals, the System 35 IS appends a new log when you exit in order to track the log time properly. Also, a new log is appended to the current log on power up.*

Entering the Parameter(s) to Log

Use this option to enter the parameters to be logged. You may log up to three different parameters at the same time.

Note: *Enter the user program as described on page 3-6.*

LOGGER

From the main menu, use the arrow keys to scroll to the LOGGER prompt, then press the [ENTER] key.

LOG SETUP

Use the arrow keys to scroll to the LOG SETUP option and press the [ENTER] key.

Note: *Before beginning setup of the data logger, check to make sure that the clock is set to the correct time and date. See "Setting the Clock Values" on page 3-28 for the procedure to follow.*

L/MODE# X

Select the desired parameter number (1, 2, or 3) with the arrow keys and then press the [ENTER] key.

LM=HYG

Use the arrow keys to select the desired mode (HYG, NONE, or BAT). Press the [ENTER] key.

LM=HYG	DP/°C

Use the arrow keys to select the desired units setting (MH, PMv, DP/°F, DP/°C, or DVM). Then, press the [ENTER] key.

Note: *If the NONE or BAT mode is chosen, the units setting screen will not appear. Simply press* [ENTER] *to return to the parameter number screen.*

Entering the Parameter(s) to Log (cont.)

L/MODE# X	If desired, repeat the above procedure to set up the other two parameters. When finished, press the [ESC] key.

Note: *Because the Series 35 IS contains a fixed amount of memory, the more parameters you select and the more frequently you log data, the shorter the total available logging time.*

LOG SETUP	Press the [ESC] key to return to the main menu.

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Viewing Log Status, Summary and Data

Use this option to view the log status, log summary and log data. Be aware that the nature of the 16-character L.C.D. display will limit the ability to view the log data.

Note: *Enter the user program as described on page 3-6.*

LOGGER	From the main menu, use the arrow keys to scroll to the LOGGER prompt, then press the [ENTER] key.
LOG DISPLAY	Use the arrow keys to scroll to the LOG DISPLAY option and press the [ENTER] key.

Viewing Log Status

Note: *The log status applies only to the current log.*

VIEW LOG STATUS	Use the arrow keys to scroll to VIEW LOG STATUS and press the [ENTER] key.
Records: 109 Rem: 10h 10m	The number of data points logged and the remaining logging time screens will be displayed for about 2 seconds each.
VIEW LOG STATUS	Press the [ESC] key to return to the options menu.

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Viewing the Log Summary

Follow these instructions to view the log summary.

VIEW LOG SUMMARY	Use the arrow keys to scroll to VIEW LOG SUMMARY and press the [ENTER] key.
Total #Log: xx	The total number of logs in memory will be displayed for about 2 seconds.
LOG# x Log Started at: hh:mm mm/dd/yy P: +x.xx PSG LINTV (Mins) x	For each log, the five screens shown will be displayed for about 2 seconds each.

Note: *The Series 35 IS does not log time against each data point, but logs the log time interval at the start of a log. Use the log start time and log interval to determine the data log time.*

The above sequence of five screens will repeat automatically until all of the log summaries have been displayed.

Note: *The summary display may be terminated at any time by pressing the* [ESC] *key between any pair of the five-screen sequences. This will immediately return you to the options menu.*

Viewing the Log Summary (cont.)

VIEW LOG #: xx

After the log summary has been completed, the display shown will appear. Press the [ESC] key or proceed to the next section for instructions.

VIEW LOG SUMMARY

Press [ESC] to return to the options menu.

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Viewing Log Data

Follow these instructions to view the log data.

VIEW LOG DATA	Use the arrow keys to scroll to VIEW LOG DATA and press the [ENTER] key.
VIEW LOG #: xx	After the log summary has been completed, the display shown will appear. Press the [ESC] key or proceed to the next section for instructions
Log Started at: hh:mm mm/dd/yy P: +x.xx PSG LINTV (Mins) x	For the chosen log, the four screens shown will be displayed for about 2 seconds each.
#x +x.xx PMV	The list of items in the log may now be viewed. Use the arrow keys to scroll through the list.

Note: *If more than one parameter is being logged, use the* [HYGRO] *and* [P_{const}] *keys to scroll through the parameters for each item number.*

Table 3-2 on page 3-38 shows an example of a log containing three items and three parameters per item. Scroll through the table as follows:

- [↑]: scroll up a column of items
- [↓]: scroll down a column of items
- [HYGRO]: scroll right across a row of parameters

- [P_{const}]: scroll left across a row of parameters

Viewing Log Data (cont.)

Table 3-2: Log Layout Example

Item #	Parameter		
	PMV	DP/°F	MH
1	#1 0.00PMV	#1 -166.0DP/°F	#1 -0.0019MH
2	#2 0.00PMV	#2 -166.0DP/°F	#2 -0.0019MH
3	#3 0.00PMV	#3 -166.0DP/°F	#3 -0.0019MH

Note: *You can press* [ESC] *to stop viewing the log and return to the* VIEW LOG DATA *menu at any time.*

If you scroll all the way to either side of the table, you will not be able to scroll any further in that direction. However, you may scroll back in the opposite direction. Vertical scrolling to either the top or bottom edge of the table, respectively, will lead to one of the following screens:

Skip to next ?	Press [ENTER] to view the next or previous log. Press [ESC] to stop viewing the log data.
Skip to prev ?	
# <END>	Press [ESC] to exit.
VIEW LOG DATA	Press [ESC] to return to the options menu.

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Using the Built-In RS232 Interface

The Series 35 IS data log can be transferred to a dump terminal via the built-in RS232 interface. Use the following interface settings for the transfer:

- 8 data bits
- 1 stop bit
- no parity
- 9600 baud

IMPORTANT: The RS232 interface setup and data transfer must be done in a non-hazardous area.

One of the GE Sensing RS232 cables listed in Table 3-3 below must be used to connect the RS232 connector on the Series 35IS to the serial port of the computer.

Table 3-3: RS232 Cable Assemblies

Part Number	# Pins on PC End	Length (ft)
704-693-02	9	5
704-693-03	9	10
704-693-04	9	15
704-693-05	9	20
704-693-12	25	5
704-693-13	25	10
704-693-14	25	15
704-693-15	25	20

IMPORTANT: The end of the above cables with the "MMS 35 IS" label must be connected to the hygrometer and not to the PC. Also, standard RS232 cables will not work with the Series 35 IS. Refer to Figure B-4 in Appendix B for details of the RS232 cable construction.

Dumping Logged Data Via the RS232 Interface

Use the following procedure to transfer logged data to a dump terminal via the built-in RS232 interface.

IMPORTANT: Refer to "Using the Built-In RS232 Interface" on page 3-39 to make sure the Series 35 IS is set up properly for the transfer.

LOGGER	In the main menu, use the arrow keys to scroll to LOGGER and press the [ENTER] key.
LOG DUMP	Use the arrow keys to scroll to LOG DUMP and press the [ENTER] key.
LOG DUMP ON	Use the arrow keys to scroll to LOG DUMP ON and press the [ENTER] key.
Dumping Log Dump Completed	The entire log memory is transferred to the PC. The screens shown will display the status of the data dump.

Note: *The log dump may be terminated at any time by pressing the* [ESC] *key.*

LOG DUMP	Press the [ESC] key to return to the main menu.

Dumping Logged Data Via the RS232 Interface (cont.)

The format of the dump consists of a header, modes with the TAB delineator between titles, and data with the TAB delimiter between values. The information contained in a typical dump screen is shown in Figure 3-1 on page 3-42.

To enter more setup data, proceed to the appropriate section of this manual. To return to measurement mode, press [ESC] until the RUN ? prompt appears and then press the [ENTER] key.

Log Started at: 01/09/1999 10:13
Constant Pressure = +0.00 PSG
Logging Interval = 1 minutes
LOG#=1
Mode being Logged

Time	H:DP/C	H:DP/F	H:PMv
10:13	-110	-166	0
10:14	-110	-166	0
10:15	-110	-166	0
10:16	-110	-166	0
10:17	-110	-166	0
10:18	-110	-166	0
10:19	-110	-166	0
10:20	-110	-166	0
10:21	-110	-166	0

Log Started at: 01/09/1999 10:26
Constant Pressure = +0.00 PSG
Logging Interval = 1 minutes
LOG#=2
Mode being Logged

Time	H:DP/C	H:DP/F	H:PMv
10:26	-110	-166	0

Log Started at: 01/09/1999 10:29
Constant Pressure = +0.00 PSG
Logging Interval = 1 minutes
LOG#=3
Mode being Logged

Time	H:DP/C	H:DP/F	H:PMv
10:29	-110	-166	0
10:30	-110	-166	0

Log Started at: 01/09/1999 10:31
Constant Pressure = +0.00 PSG
Logging Interval = 1 minutes
LOG#=4
Mode being Logged

Time	H:PMv	H:DP/F	H:MH
10:31	0	-166	-0.0019
10:32	0	-166	-0.0019
10:33	0	-166	-0.0019
10:34	0	-166	-0.0019
10:35	0	-166	-0.0019

Dump Completed

Figure 3-1: Example of a Dump Screen

Chapter 4

Troubleshooting and Maintenance

The Moisture Monitor Series 35 IS is designed to be maintenance and trouble free. Due to process conditions and other factors, however, minor problems may occur. This chapter discusses some of the most commonly encountered problems and the procedures for correcting them. If you cannot find the information you need in this chapter, contact GE Sensing.

Caution!
Do not attempt to troubleshoot the Series 35 IS beyond the instructions in this chapter. If you do, you may damage the unit and void the warranty.

This section includes the following information:

- Common Problems [page 4-1]
- Screen Messages [page 4-5]
- Calibration Error Processing [page 4-7]
- Recharging and Replacing the Battery [page 4-8]
- Replacing the User Program [page 4-13]
- Replacing and Recalibrating the Moisture Probe [page 4-20]

Common Problems

Incorrect Series 35 IS measurement readings may indicate a problem with the probe or a component of the system. Table 4-1 on page 4-2 lists the most common problems that affect measurement and ways that you can rectify the problems.

Table 4-1: Troubleshooting Guide

Symptom	Possible Cause	System Response	Action
Accuracy of moisture sensor is questioned	Insufficient time for system to equilibrate	Probe reads too wet during dry down conditions, or too dry in wet up conditions	Change the flow rate. A change in dew point indicates the sample system is not at equilibrium, or there is a leak. Allow sufficient time for sample system to equilibrate and moisture reading to become steady. Check for leaks.
	Dew point at sampling point is different than the dew point of the main stream	Probe reads too wet or too dry	Readings may be correct if the sampling point and main stream do not run under the same process conditions. The different process conditions cause the readings to vary. Refer to Appendix A for more information. If sampling point and main stream conditions are the same, check sample system pipes and any pipe between the sample system and main stream for leaks. Also, check sample system for adsorbing water surfaces, such as rubber or plastic tubing, paper-type filters, or condensed water traps. Remove or replace contaminating parts with stainless steel parts.
	Sensor or sensor shield affected by process contaminant (refer to Appendix A)	Probe reads too wet or too dry	Clean the sensor and the sensor shield as described in Appendix A. Then reinstall the sensor.
	Sensor is contaminated with conductive particles (refer to Appendix A)	Probe reads high dew point	Clean the sensor and the sensor shield as described in Appendix A. Then reinstall the sensor. Also, install a proper filter (i.e. sintered or coalescing element).
	Sensor is corroded (refer to Appendix A)	Probe reads too wet or too dry	Return the probe to factory for evaluation.

Table 4-1: Troubleshooting Guide (cont.)

Symptom	Possible Cause	System Response	Action
Accuracy of moisture sensor is questioned	Sensor temperature is greater than 70°C (158°F)	Probe reads too dry	Return the probe to factory for evaluation.
	Stream particles causing abrasion	Probe reads too wet or too dry	Return the probe to factory for evaluation.
Slow response	Slow outgassing of system	N.A.	Replace the system components with stainless steel or electro-polished stainless steel
	Sensor is contaminated with non-conductive particles (refer to Appx. A)	N.A.	Clean the sensor and the sensor shield as described in Appendix A. Then, reinstall the sensor.
Accuracy of moisture sensor is questioned	Insufficient time for system to equilibrate	Probe reads too wet during dry down conditions, or too dry in wet up conditions	Change the flow rate. A change in dew point indicates the sample system is not at equilibrium, or there is a leak. Allow sufficient time for sample system to equilibrate and moisture reading to become steady. Check for leaks.
	Shorted circuit on sensor	N.A.	Run “dry gas” over sensor surface. If high reading persists, then probe is probably shorted and should be returned to the factory for evaluation.
	Sensor is contaminated with conductive particles (refer to Appendix A)	N.A.	Clean the sensor and the sensor shield as described in Appendix A. Then, reinstall the sensor.
	Improper cable connection	N.A.	Check the cable connections to both the probe and the Series 35 IS.

Table 4-1: Troubleshooting Guide (cont.)

Symptom	Possible Cause	System Response	Action
Screen always reads the driest (lowest) programmed moisture calibration value while displaying dew/frost point	Open circuit on sensor	N.A.	Return the probe to the factory for evaluation.
	Non-conductive material is trapped under contact arm of sensor	N.A.	Clean the sensor and the sensor shield as described in Appendix A. Then reinstall the sensor. If the low reading persists, return the probe to the factory for evaluation.
	Improper cable connection	N.A.	Check the cable connections to both the probe and the Series 35 IS.

Screen Messages

Several Series 35 IS screen messages may display during operation of the unit. Table 4-2 lists these messages, possible causes of them and recommended solutions to them.

Table 4-2: Screen Messages

Display	Possible Cause	System Response	Action
Blank	Loss of Power	System shutdown	Turn off unit and recharge or replace the battery. (See *Recharging and Replacing the Battery*, page 4-8.)
"Loading..." (reinitializes) "Autocal..." (displays measurement)	Watchdog reset	System resets because watchdog signal is not generated within 1.6 seconds. Fault alarm is on for approximately 20 seconds.	Call GE Sensing if this happens more than 5 times within ten minutes.
"CAL ERROR"	Internal reference components may be out of specifications. (Only occurs when unit is set to measure DP/°C, DP/°F, or PPM_v.)	Measurement stops for affected modes.	Check wiring. Call GE Sensing.
Reads over or under range	Signal received is lower or higher than calibration data supplied with probe	System defaults to lowest or highest dew point found in calibration data	Check probe for open circuit or shorts if probe is not subjected to extreme dry or wet conditions. Contact GE Sensing regarding a higher calibrated probe.
"Supply Low" displays for 1 hour, then "Shutdown Please"	Battery power is low	Loss of power	Turn unit off and recharge or replace battery (See *Recharging & Replacing the Battery*, page 4-8.)

Calibration Error Processing

A Calibration Error indicates a failure during the measurement of the internal moisture references. During Autocal, internal references are read repeatedly and the Series 35 IS compares measured values to a table of acceptable factory calibration values. The system calculates and corrects any deviation from the factory values. If a reference falls outside the acceptable range, a CAL ERROR message appears.

If you attempt to display data after the system experiences a calibration error, the display reads "CAL ERROR DP/°C."

Note: *The units displayed, (e.g., °C) depends on the previously selected measurement units.*

Recharging and Replacing the Battery

Portable battery-powered units, with and without internal sample systems, require a battery charger that accepts either 110 VAC or 220 VAC input, and outputs 12 volts DC at a maximum current of 500 mA.

A fully charged Series 35 IS battery pack provides continuous operation for between 12 hours (with the backlight on) and 120 hours (with the backlight off). When the battery charge is low (usually below 5.85 volts), the screen blinks and displays the "Supply Low" prompt. This display remains on the screen for approximately one (1) hour before the Series 35 IS shuts down the electronics.

Recharging the Battery

GE Sensing supplies a suitable charger with each Series 35 IS battery-powered unit.

Caution!
Make all AC connections to charge the battery in a non-hazardous, general-purpose area.

If the battery is low, move the Series 35 IS to a non-hazardous area and connect the charger to the unit. While the battery is being charged, the unit may be turned back on. The Series 35 IS displays “Loading....” while it initializes, then returns to whatever it displayed when it was turned off.

The Series 35 IS begins charging when you plug it into AC power. A full charge takes 16 hours. Use the following steps to recharge the battery.

1. Turn the unit off.
2. Plug the charger into the line power.
3. Plug the other end of the charger into the connector on the left side of the electronics unit.
4. Charge the unit for 16 hours.

Note: *The unit can continue to operate while its batteries are being charged.*

!WARNING!
Do not connect the Series 35 IS to a charger in a hazardous environment.

Replacing the Battery

If the battery of your Series 35 IS does not hold a charge for a full 12 hours after 16 hours of recharging, the battery needs replacement. Contact the factory for a new one.

Always store the Series 35 IS lead acid battery at room temperature (≈25°C). Table 4-3 below illustrates how periods of storage deplete battery capacity.

Table 4-3: Battery Capacity in Storage

Storage Time at Room Temperature	Capacity
3 months	91%
6 months	82%
12 months	64%

Refer to Figure 4-1 on page 4-11 and complete the following steps to remove the old battery:

Note: *The only tools needed to change the Series 35 IS battery are a standard screwdriver to open the case and a 1/8" Allen wrench to remove the battery cover.*

1. Loosen the two quarter-turn screws on the back of the Series 35 IS cover. Remove the cover by lifting it off the unit from back to front.
2. Disconnect the ribbon cable that connects the encapsulated charger board to connector J3 on the back of the main printed circuit board, which is mounted in the cover of the Series 35 IS. See Figure 4-1 on page 4-11 and Figure 4-2 on page 4-15.

Note: *Pin 1 of connector J3 is clearly labeled on the circuit board, and the side of the ribbon cable that must align with pin 1 has been marked as such at the factory.*

Replacing the Battery (cont.)

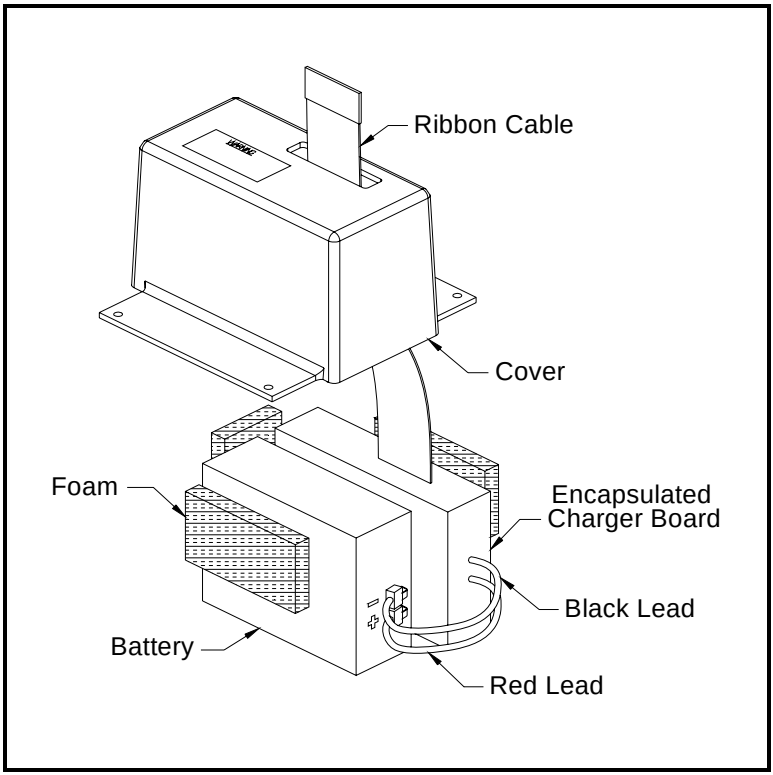


Figure 4-1: Battery Pack with Charger Board

3. Use the Allen wrench to remove the four socket head cap screws that secure the battery cover to the base plate.
4. Lift the battery cover out of the electronics unit and slide the battery and the encapsulated charger board out of the battery cover.
5. Disconnect the leads from the encapsulated charger board by removing the two crimp pins from the battery terminals (take care not to damage the wires).

Replacing the Battery (cont.)

Refer to Figure 4-1 on page 4-11 and Figure 4-2 on page 4-15 and use the following steps to install the new battery:

1. Connect the two (2) leads from the encapsulated charger board to the new battery by pressing the crimp pins on the ends of the leads onto the terminals of the new battery.

IMPORTANT: *Make sure the red lead is connected to the "+" battery terminal and the black lead is connected to the "–" battery terminal.*

2. Insert the new battery and the encapsulated charger board into the battery cover. Make sure the ribbon cable is threaded through the slot in the battery cover.
3. Place the battery pack assembly into position in the electronics unit, and secure the battery cover to the base plate with the four (4) screws previously removed.
4. Reconnect the ribbon cable from the encapsulated charger board to connector J3 on the back of the main printed circuit board. Make sure that the side of the ribbon cable with the factory marking is aligned with the end of connector J3 that is labeled as pin 1.
5. Replace the Series 35 IS cover by attaching it to the unit from front to back. Tighten the two quarter-turn screws on the back of the cover.

Replacing the User Program

The user program is stored on an EPROM (Erasable Programmable Read Only Memory) chip. The EPROM is located on the main printed circuit board (No. 703-1262), which is mounted in the cover of the Series 35 IS electronics unit.

You must do the following to replace the user program:

- Remove the main printed circuit board.
- Replace the EPROM.
- Reinstall the main printed circuit board.

Refer to the following sections to replace the user program. Contact GE Sensing if your unit contains a main circuit board with a registration number other than 703-1262.

Removing the Circuit Board

See Figure 4-2 on page 4-15 to locate the cable connections on the back (non-component side) of the main printed circuit board.

Note: *The main printed circuit board is mounted on the inside of the electronics cover.*

Caution!
Remove the circuit board to a non-hazardous area.

1. Turn the power off and, if applicable, unplug the unit.

!WARNING!
You must turn off and unplug the Series 35 IS before continuing with the following steps.

2. Discharge static electricity from your body before touching the Series 35 IS enclosure.
3. Open the Series 35 IS enclosure by loosening the two quarter-turn screws on the back of the unit and gently lifting the cover off from back to front.

There are five (5) detachable cables plugged into the back (non-component side) of the printed circuit board. Refer to Table 4-4 below for a description of these cables.

Table 4-4: Printed Circuit Board Cables

Cable Type	Connector	Source
2-Wire	J2	ON/OFF Switch
16-conductor Ribbon	J3	Battery Pack
14-conductor Ribbon	J4	Display Board
2-Wire	J5	Display Backlight
9-conductor Ribbon	J6	Keypad

Removing the Circuit Board (cont.)

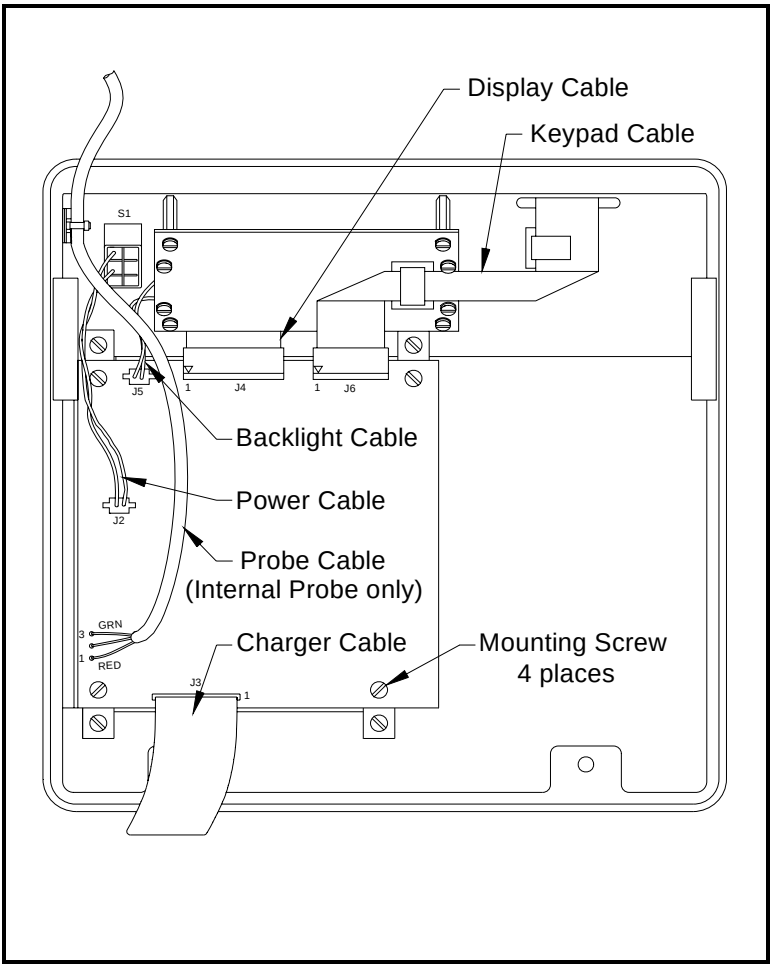


Figure 4-2: Rear of PC Board - Cable Connections

Note: *Be careful not to pull on the cables while removing the cover.*

IMPORTANT: *Before disconnecting the ribbon cables, mark the side of each cable that is near pin 1 of its circuit board connector. Pin 1 is clearly labeled on the circuit board for J3, J4 and J6. See Figure 4-2 above.*

Removing the Circuit Board (cont.)

4. Disconnect the five (5) cables from the J2, J3, J4, J5, and J6 connectors on the back (non-component side) of the main printed circuit board.

IMPORTANT: *To maintain good contact at each terminal block and to avoid damaging the pins on a connector, pull the connector straight off (not at an angle).*

5. If your Series 35 IS includes a self-contained sample system, you must disconnect the moisture probe cable from the probe at this time (refer to *Installing a Probe into a Sample System* in Chapter 2).

6. Remove any external connections to the Series 35 IS. These may include: the battery charger, an RS232 interface cable and/or a moisture probe cable from an external sample system.

7. Remove the main printed circuit board from inside the cover by unscrewing the four screws that fasten the circuit board to its mounting bracket.

8. Turn the circuit board over to access the EPROM on the component side of the circuit board.

Note: *To replace the circuit board, refer to* Replacing the Circuit Board *on page 4-19.*

Replacing the EPROM

Caution!

EPROMs can be damaged by static electricity. Be sure to discharge any static electricity from your body before handling the EPROM.

Replace the EPROM by carefully completing the following steps in the order presented.

1. Refer to Figure 4-3 on page 4-18 to locate the EPROM (labeled U18) on the component side of the main printed circuit board.
2. Use a chip puller to remove the EPROM. If you do not have a chip puller, use a small screwdriver to carefully wedge the chip out of its mounting. Be sure none of the EPROM legs breaks off in the socket.
3. Insert the new EPROM into the socket labeled U18, making sure the notch on the EPROM aligns with the notch on the socket. See Figure 4-3 on page 4-18.
4. If all the EPROM legs do not align with the corresponding holes in the socket, gently remove the EPROM and place it on its side (where the legs are located) on a flat surface. Then, gently roll the EPROM toward the legs to bend the row of legs slightly inward.

Caution!

The EPROM legs are very delicate and may snap off if they are bent too far or too many times.

5. Repeat step 4 for the legs on the opposite side of the EPROM. Then, insert the EPROM back into its socket, making sure that the notch on the EPROM aligns with the notch on the socket.

Replacing the EPROM (cont.)

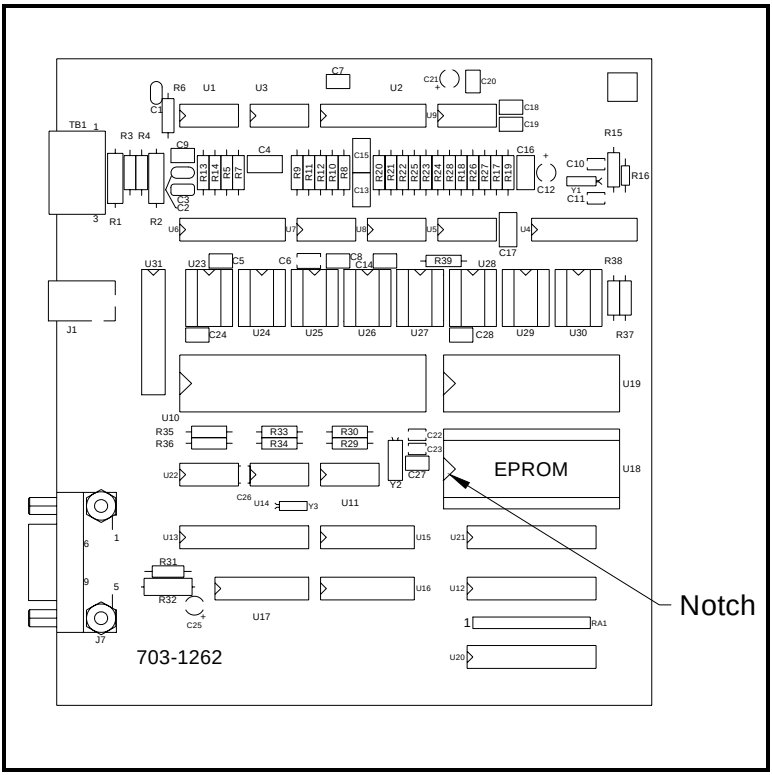


Figure 4-3: EPROM (U18) Notch Location

6. Gently press the EPROM into place until it is fully seated in the socket, making sure not to bend or break any of the legs. Repeat steps 4 and 5 if necessary.

Caution!

Do not force the EPROM into the socket. If the EPROM does not seat easily, check for bent legs or legs that do not properly align with the corresponding holes in the socket.

Replacing the Circuit Board

1. Turn the circuit board over so that the component side (the side with the EPROM) of the board faces the inside of the Series 35 IS cover, and position the circuit board on the mounting bracket in the cover.

Note: *When orienting the circuit board within the electronics unit cover, make certain that the RS232 connector, battery charger jack and external probe cable connector are properly inserted into the cutouts in the side panel of the cover.*

2. Install and tighten the four (4) previously removed bracket screws and washers in the corners of the circuit board.
3. If your unit includes a self-contained sample system, reconnect the moisture probe cable to the probe at this time (see Chapter 2, *Installing a Probe into a Sample System*).
4. Reconnect the five (5) cables to the J2, J3, J4, J5, and J6 connectors on the back (non-component side) of the circuit board. The cables that connect to J2 and J5 are polarized and can only be inserted in the correct orientation. However, the three (3) ribbon cables could be rotated 180° from the proper alignment. Therefore, make sure that the previously applied pin 1 marking on each ribbon cable aligns with the pin 1 label on the circuit board at the J3, J4 and J6 connectors.

IMPORTANT: *To maintain good contact at each terminal block and to avoid damaging the pins on a connector, push the connector straight on (not at an angle).*

5. Replace the Series 35 IS cover by attaching it to the unit from front to back. Tighten the two quarter-turn screws on the back of the unit.
6. Reconnect any external cables such as the battery charger, an RS232 interface cable and/or the moisture probe cable from an external sample system.

Replacing and Recalibrating the Moisture Probe

For maximum accuracy you should send probes back to the factory for recalibration every six months to one year, depending on the application. Under severe conditions you should send the probes back for recalibration more frequently. Contact a GE Sensing applications engineer for the recommended calibration frequency for your application.

When you receive a new or recalibrated probe, make sure to install and connect it as described in Chapter 2, *Installing a Probe into a Sample System*. Once you have installed and connected the probes, enter the calibration data as described in Chapter 3, *Entering Calibration Data*.

Note: *An individualized Calibration Data Sheet, containing the corresponding probe serial number, accompanies each probe.*

Chapter 5

Specifications

The Moisture Monitor Series 35 IS has been designed to meet or exceed the specifications listed in this chapter. The information has been divided into the following two categories:

- Electrical Specifications [page 5-2]
- General Specifications [page 5-3]

Electrical Specifications

Functions:

Dew Point:
PPMv in gases at constant pressure
(pressure by programmable constant).

Inputs:

Moisture:
Single input via M-Series probe connected to main board. Probe may be remotely located up to 100 m (330 ft) from electronic console, except for units with self-contained internal sample systems.

Intrinsic Safety:

BASEEFA-certified intrinsically safe probe and cable.
ISSEP-certified intrinsically safe hygrometer (Code: EEx ia IICT4)

Computer-Enhanced Response:

Optional

Display Units:

Dew/frost point temperature: ºC, ºF, PPMv, MH
Pressure: psi(g), bar, kPa(g), kg/cm^2(g)

Power Requirements:

AC power supply:
Voltage: Specify as 100, 120, 230, or 240 VAC
Frequency: Specify as 50/60 Hz
12V Charger Input Power: 5 watts, maximum
Rechargeable Battery Pack: Battery power for 12-hour operation (with backlight) or 120-hour operation (without backlight)

General Specifications

Temperature:

Operating: 0° to 60°C (32º to 140ºF)
Storage: -20° to 70°C (-22º to 158ºF).

Configurations:

Battery Powered
Battery Powered with self-contained Sample System.

Dew/Frost Point Temperature:

Overall calibration range capability:
+60° to -110°C (+140º to -166ºF).

Available Calibration Range Options:

Standard Calibration Range:
20º to -80ºC with data to -110ºC
(68º to -112ºF with data to -166ºF)

Extended High Calibration Range:
60º to -80ºC with data to -110ºC
(140º to -112ºF with data to -166ºF)

Accuracy:
±2°C from 60° to -65°C (140º to -85ºF)
±3°C from -66° to -110°C (-86º to -166ºF)

Repeatability:
±0.5°C from 60° to -65°C (140º to -85ºF)
±1.0°C from -66° to -110°C (-86º to -166ºF)

General Specifications (cont.)

Response Time:

5 sec for 63% of a step change in moisture content in either wet up or dry down cycle

Gas Flow Range:

From static to 10,000-cm/s linear velocity at 1 atm

Sensor Type:

GE Sensing M-Series thin-film aluminum oxide

Traceability:

Every moisture probe is individually computer-calibrated against known moisture concentration standards, traceable to National Institute of Standards and Technology (NIST) or National Physical Lab, U.K. (NPL) as accredited by Irish National Accreditation Board (INAB).

Temperature:

Operating and Storage:
-110º to +70ºC (-166º to 158ºF)

@LEVEL4A = Pressure:

Operating:
5 microns Hg to 5000 psig

Appendix A

Outline and Installation Drawings

This appendix contains the following outline and installation drawings:

- MMS35 IS with Sample System (ref. dwg #712-940)
- MMS35 IS without Sample System (ref. dwg #712-940)
- Internal Sample System Assembly (ref. dwg #750-297)
- RS232 Cable Assembly (ref. dwg #704-693)

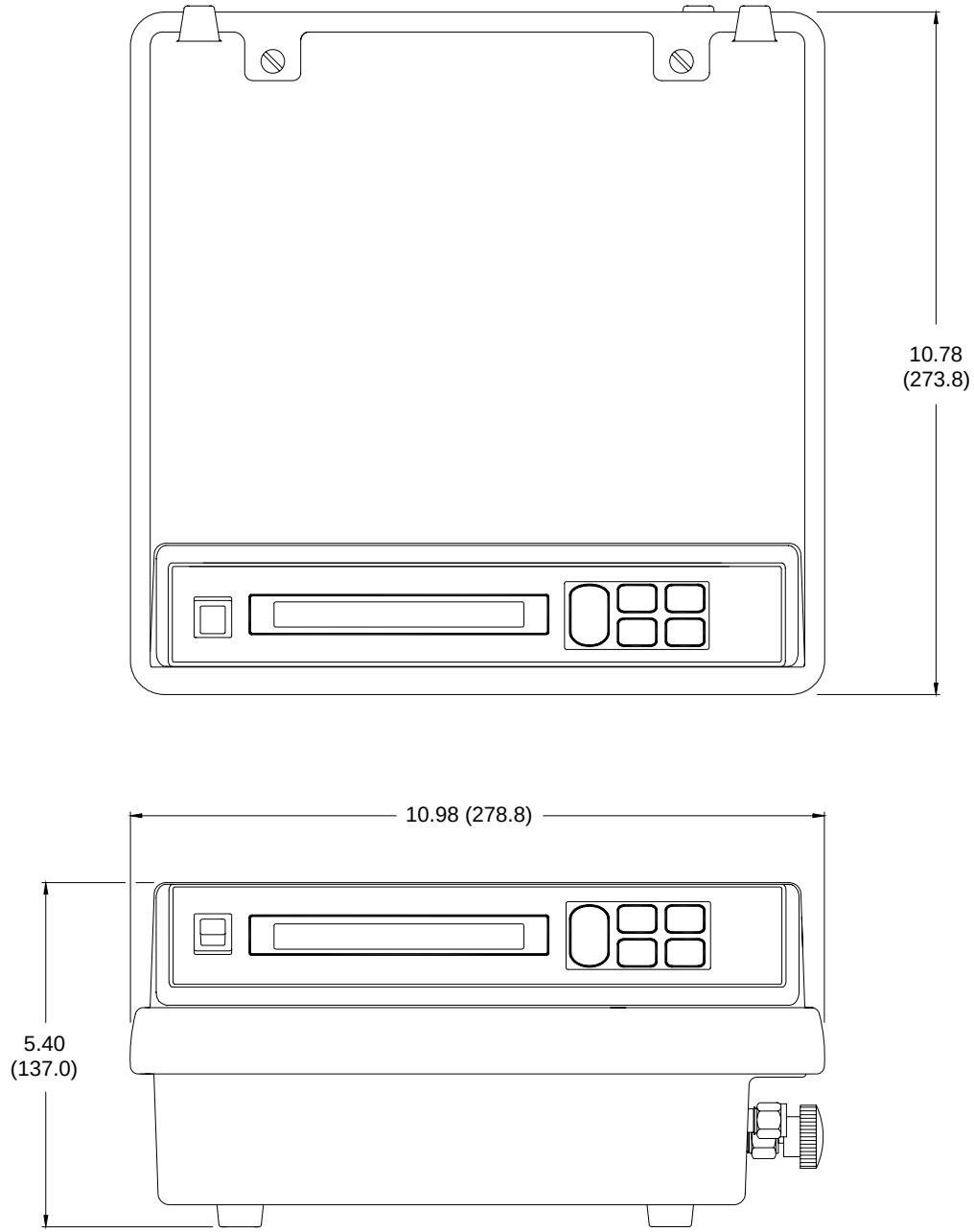


Figure A-1: MMS35 IS with Sample System (ref. dwg #712-940A)

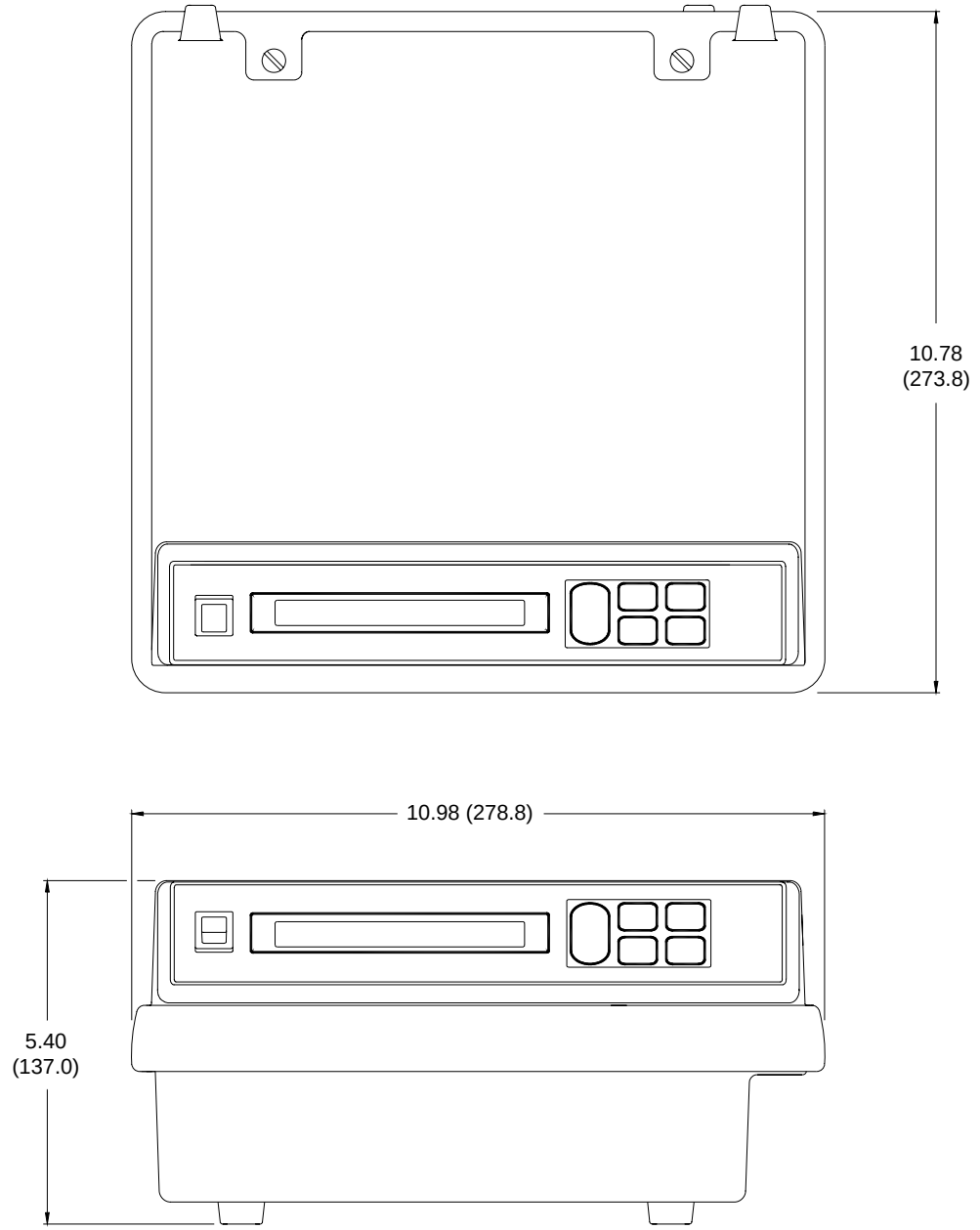
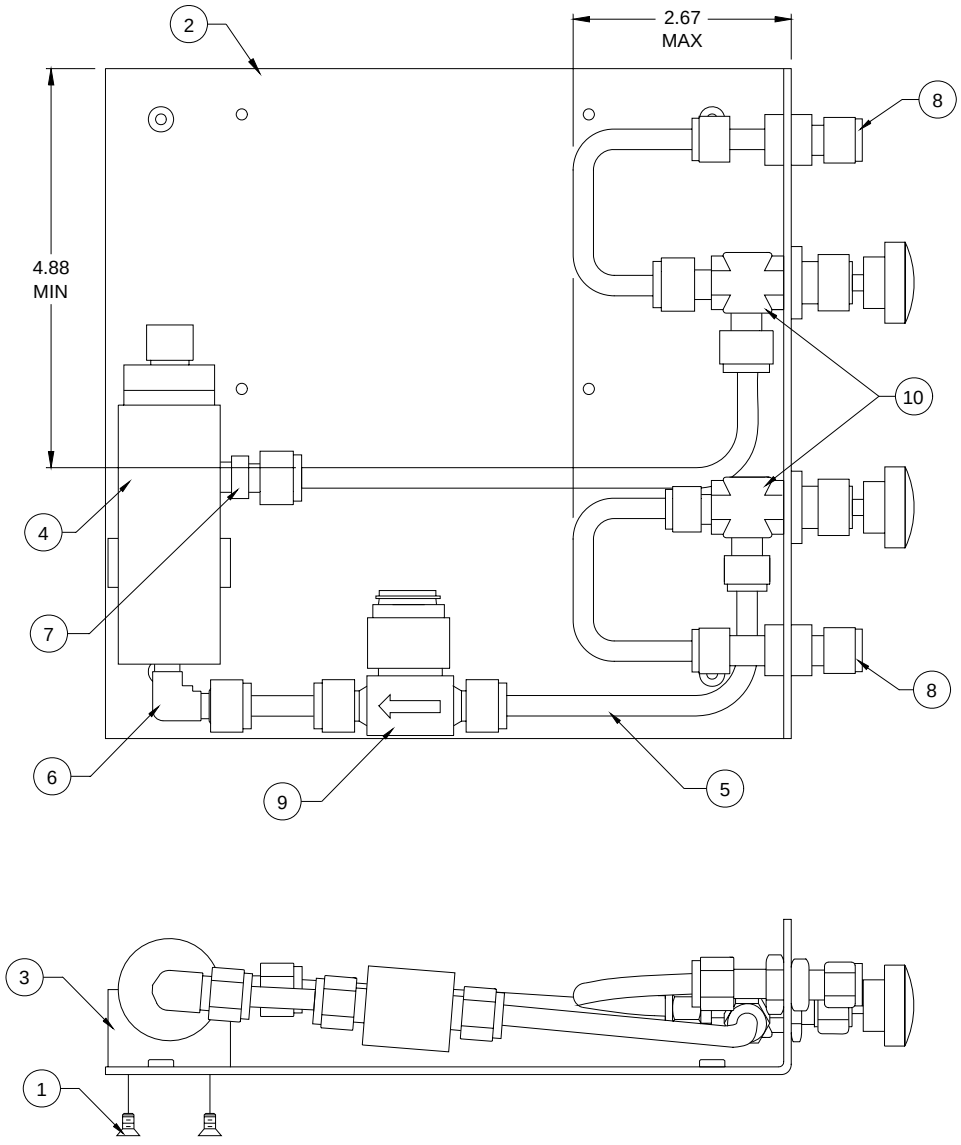


Figure A-2: MMS35 IS without Sample System (ref. dwg #712-940B)



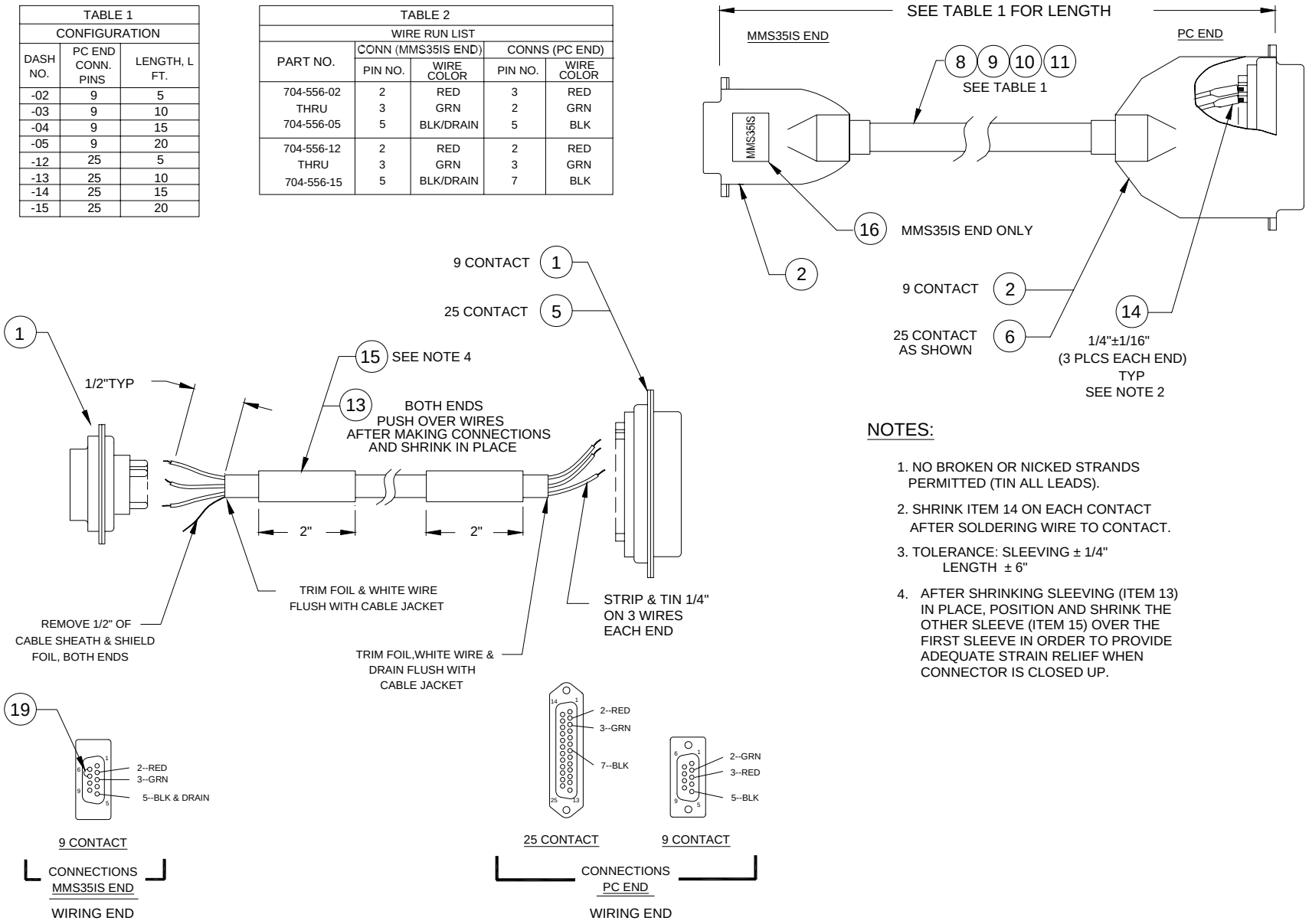
PARTS LIST

ITEM	PART NO.	DESCRIPTION	MANUFACTURER	QTY
1	412-722-03	Screw, PH, FH 6-32 x3/16"	GE Panametrics	2
2	421-882	Base Plate	GE Panametrics	1
3	421-638	Bracket, Sample Cell	GE Panametrics	1
4	2530	Sample Cell	GE Panametrics	1
5	304SS	Tubing 1/4" x .035	Seamless Tubing	A/R
6	SS-400-2-2	Elbow Fitting	Swagelok	1
7	SS-400-1-2	Fitting	Swagelok	1
8	SS-400-61	Fittings	Swagelok	2
9	SS-4TF-7	Filter	Nupro	1
10	SS-1RS4-A	Valves	Whitey	2

Figure A-3: Internal Sample System Assembly (ref. dwg #750-297)

TABLE 1		
CONFIGURATION		
DASH NO.	PC END CONN. PINS	LENGTH, L FT.
-02	9	5
-03	9	10
-04	9	15
-05	9	20
-12	25	5
-13	25	10
-14	25	15
-15	25	20

TABLE 2				
WIRE RUN LIST				
PART NO.	CONN (MMS35IS END)		CONNS (PC END)	
	PIN NO.	WIRE COLOR	PIN NO.	WIRE COLOR
704-556-02	2	RED	3	RED
THRU	3	GRN	2	GRN
704-556-05	5	BLK/DRAIN	5	BLK
704-556-12	2	RED	2	RED
THRU	3	GRN	3	GRN
704-556-15	5	BLK/DRAIN	7	BLK



NOTES:

1. NO BROKEN OR NICKED STRANDS PERMITTED (TIN ALL LEADS).
2. SHRINK ITEM 14 ON EACH CONTACT AFTER SOLDERING WIRE TO CONTACT.
3. TOLERANCE: SLEEVING ± 1/4" LENGTH ± 6"
4. AFTER SHRINKING SLEEVING (ITEM 13) IN PLACE, POSITION AND SHRINK THE OTHER SLEEVE (ITEM 15) OVER THE FIRST SLEEVE IN ORDER TO PROVIDE ADEQUATE STRAIN RELIEF WHEN CONNECTOR IS CLOSED UP.

Figure A-4: RS232 Cable Assembly (ref. dwg #704-693)

Appendix B

Menu Map

Figure C-1 is a top-level diagram of the Series 35 IS menu. Once you are familiar with how the Series 35 IS operates, use this diagram as a reference for moving through the user program.

To enter the programming mode, perform the following sequence within five (5) seconds, or the Series 35 IS will time out and return to the measurement mode.

P: +0.00 Kcmg	While in run mode, press the [ESC] key.
ESC	Within 5 seconds of the appearance of this display, press the [ENTER] key followed by the [ESC] key.
PROGRAM MENU	This will display for 1 second.
DP RANGE	You are now in the user program menu.

From the main menu, use the arrow keys to scroll through the options to your selection. Use the [ENTER] key to confirm your selection or the [ESC] key to cancel your selection.

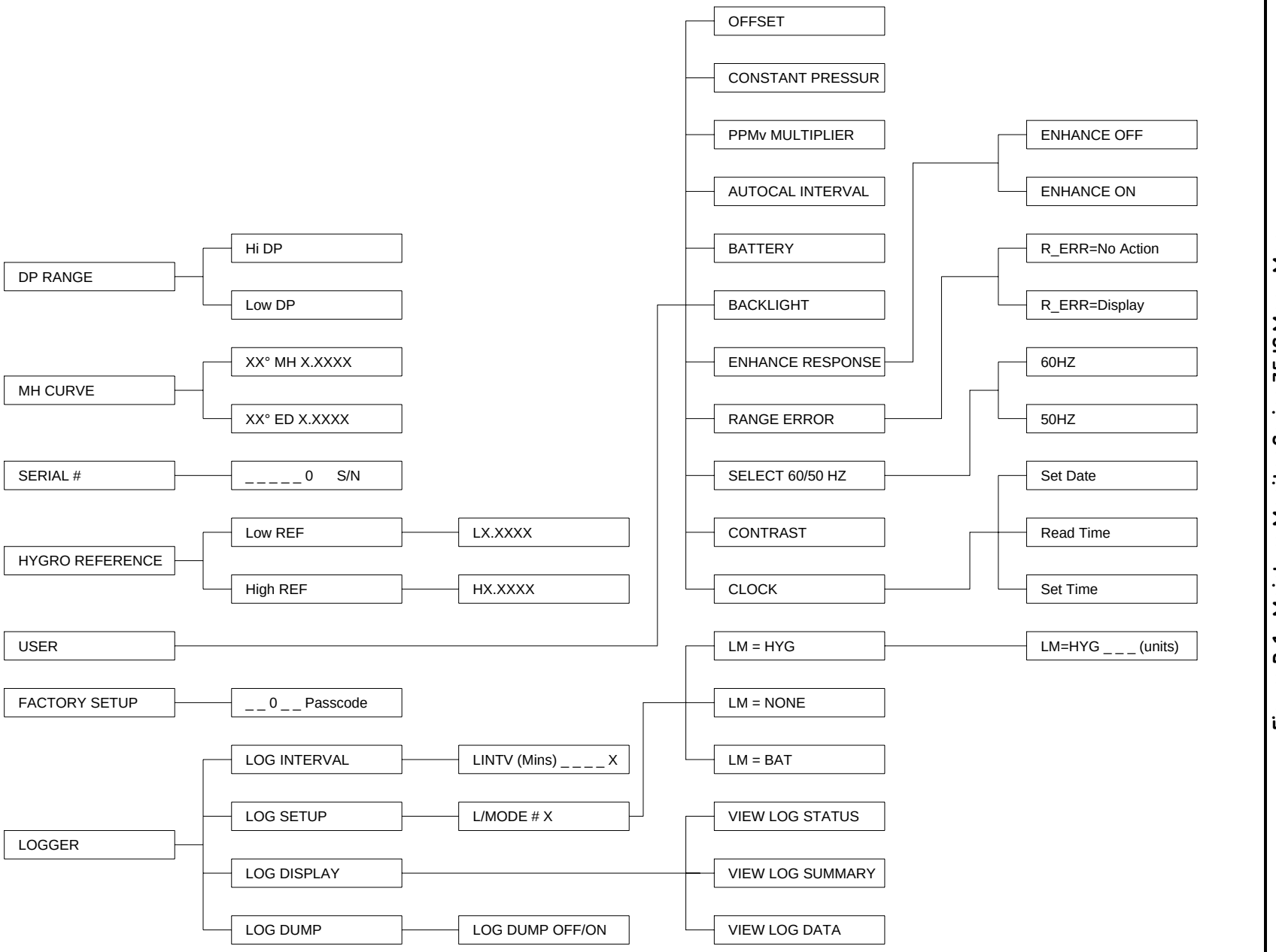


Figure B-1: Moisture Monitor Series 35 IS Menu Map

Appendix C

Data Information Sheet

Use this sheet to record all of the data that you enter into the user program. If data is lost for any reason, use this sheet to re-program your unit. Store this sheet and any other related documents in a safe place for future reference.

Tables are provided for entry of the following information:

- Dew Point Measurement Range [page -2]
- Calibration Data for Moisture [page -2]
- Serial Number [page -3]
- MH Reference Values for Moisture [page -3]
- User Defined Functions [page -3]
- Logger [page -4]

Series 35 IS Data Information Sheet

Notes:

Date: _____

Unit Serial Number: _____

Application Description: _____

_____

Table C-1: Dew Point Measurement Range

High	Low

Table C-2: Calibration Data for Moisture

Point #	MH Value
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	

Series 35 IS Data Information Sheet (cont.)

Table C-3: Serial Number

___ ___ ___ ___ ___ ___

Table C-4: MH Reference Values for Moisture

High	Low

Table C-5: User-Defined Functions

Function	Setting
Offset Value	
Constant Pressure	
PPMv Constant Multiplier	
Autocal Interval	
Battery	
Backlight-On Time Interval	
Computer-Enhanced Response	
Range Error Handling	
Selecting 60/50 Hz	

Series 35 IS Data Information Sheet (cont.)

Table C-6: Logger

Function	Setting	
Log Interval	LINTV (Mins): _____	+
Log Setup	L/Mode #1:	HYG NONE BAT (units = _____)
	L/Mode #2:	HYG NONE BAT (units = _____)
	L/Mode #3:	HYG NONE BAT (units = _____)
Log Display	View Log Status	_____
	View Log Summary	_____
	View Log Data	_____
Log Dump	OFF _____	ON _____

Appendix D

Series 35 IS Hygrometer Spare Parts

Spare parts for the portable Moisture Monitor Series 35 IS are available directly from GE Sensing. Table D-1 below lists the ordering information for the most commonly needed spare parts. If you require parts that are not listed in Table D-1, contact GE Sensing for assistance.

Table D-1: Spare Parts List

P/N	Qty*	Description
705-799	1	Display Assembly
200-050	1	Battery Pack
M2L	1	Moisture Probe
201-055	1	120V Battery Charger
201-066	1	240V Battery Charger
076	1**	7-micron Sintered SS Filter Elements (pkg. of 4)

* recommended for 0-2 years operation
**required only for unit with internal sample system

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GE Infrastructure
Sensing

DECLARATION OF CONFORMITY

We,

Panametrics Limited
Shannon Industrial Estate
Shannon, County Clare
Ireland

declare under our sole responsibility that the

Moisture Monitor Series 35IS Portable Analyzer
PM880 Portable Moisture Monitor

to which this declaration relates, are in conformity with the following standards:

- EN 50014:1997+A1+A2:1999
- EN 50020:1994
- EN50284:1999
- II 1 G EEx ia IIC T4
  PM880: BASEEFA02ATEX0191
  Baseefa (2001) Ltd/EECS, Buxton SK17 9JN, UK
  MMS 35IS: ISSeP01ATEX035 X; ISSeP, B7340 Colfontaine, Belgium
- EN 61326:1998, Class A, Annex C, Continuous Unmonitored Operation
  (for EN 61000-4-3, the **MMS 35IS** meets performance Criteria A and, in a limited number of frequencies, performance Criteria B per EN 61326.)

following the provisions of the 89/336/EEC EMC Directive and the 94/9/EC ATEX Directive.

The *units listed above and any sensors and ancillary sample handling systems supplied with them* do not bear CE marking for the Pressure Equipment Directive, as they are supplied in accordance with Article 3, Section 3 (sound engineering practices and codes of good workmanship) of the Pressure Equipment Directive 97/23/EC for DN<25.

Shannon - July 1, 2003

Mr. James Gibson
GENERAL MANAGER

GE Infrastructure
Sensing

DECLARATION DE CONFORMITE

Nous,

Panametrics Limited
Shannon Industrial Estate
Shannon, County Clare
Ireland

déclarons sous notre propre responsabilité que les

Moisture Monitor Series 35IS Portable Analyzer
PM880 Portable Moisture Monitor

rélatif á cette déclaration, sont en conformité avec les documents suivants:

- EN 50014:1997+A1+A2:1999
- EN 50020:1994
- EN50284:1999
- II 1 G EEx ia IIC T4
  PM880: BASEEFA02ATEX0191
  Baseefa (2001) Ltd/EECS, Buxton SK17 9JN, UK
  MMS 35IS: ISSeP01ATEX035 X; ISSeP, B7340 Colfontaine, Belgium
- EN 61326:1998, Class A, Annex C, Continuous Unmonitored Operation
  (for EN 61000-4-3, the **MMS 35IS** meets performance Criteria A and, in a limited number of frequencies, performance Criteria B per EN 61326.)

suivant les régles de la Directive de Compatibilité Electromagnétique 89/336/EEC et d'ATEX 94/9/EC.

Les *matériels listés ci-dessus, ainsi que les capteurs et les systèmes d'échantillonnages pouvant être livrés avec* ne portent pas le marquage CE de la directive des équipements sous pression, car ils sont fournis en accord avec la directive 97/23/EC des équipements sous pression pour les DN<25, Article 3, section 3 qui concerne les pratiques et les codes de bonne fabrication pour l'ingénierie du son.

Shannon - July 1, 2003

Mr. James Gibson
DIRECTEUR GÉNÉRAL

CERT-DOC-H3

I.S. EN ISO 9002
Shannon

TÜV ESSEN
ISO 9001
U.S.

August 2004)

GE Infrastructure
Sensing

KONFORMITÄTS-ERKLÄRUNG

Wir,

Panametrics Limited
Shannon Industrial Estate
Shannon, County Clare
Ireland

erklären, in alleiniger Verantwortung, daß die Produkte

Moisture Monitor Series 35IS Portable Analyzer
PM880 Portable Moisture Monitor

folgende Normen erfüllen:

- EN 50014:1997+A1+A2:1999
- EN 50020:1994
- EN50284:1999
- II 1 G EEx ia IIC T4
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  Baseefa (2001) Ltd/EECS, Buxton SK17 9JN, UK
  MMS 35IS: ISSeP01ATEX035 X; ISSeP, B7340 Colfontaine, Belgium
- EN 61326:1998, Class A, Annex C, Continuous Unmonitored Operation
  (for EN 61000-4-3, the **MMS 35IS** meets performance Criteria A and, in a limited number of frequencies, performance Criteria B per EN 61326.)

gemäß den Europäischen Richtlinien, Niederspannungsrichtlinie EMV-Richtlinie Nr.: 89/336/EG und ATEX Richtlinie Nr. 94/9/EG.

Die *oben aufgeführten Geräte und zugehörige, mitgelieferte Sensoren und Handhabungssysteme* tragen keine CE-Kennzeichnung gemäß der Druckgeräte-Richtlinie, da sie in Übereinstimmung mit Artikel 3, Absatz 3 (gute Ingenieurpraxis) der Druckgeräte-Richtlinie 97/23/EG für DN<25 geliefert werden.

Shannon - July 1, 2003

Mr. James Gibson
GENERALDIREKTOR

CE

I.S. EN ISO 9002
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